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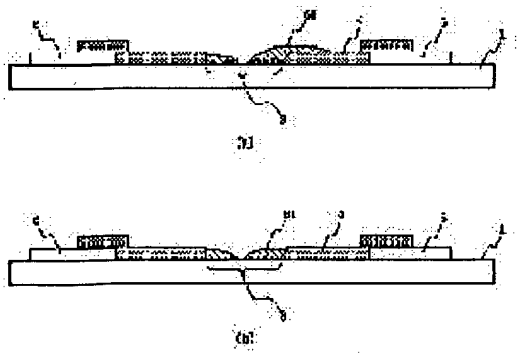
(54) ELECTRON EMISSION ELEMENT AND ITS MANUFACTURE, AND ELECTRON SOURCE USING THAT ELECTRON EMISSION ELEMENT, AND IMAGE FORMATION DEVICE

(57)Abstract:

PURPOSE: To make possible stable control, and lessen an element current as far as possible, and besides, enlarge an emission element as far as possible so as to improve efficiency by having a deposit, which has carbon for its main ingredient, at a high- resistance part.

CONSTITUTION: The material constituting a film (conductive film) 4 including an electron emission part 3 is a metal such as Pd, Ru, etc., an oxide such as PdO, etc., a boride such a HfB2, etc., a carbide such as TiC, etc., a nitride such as TiN, etc., a semiconductor such as Si, etc., carbon, or the like, and it consists of fine particles. Moreover, the part 3 is made at one part of a film 4. For example, it is a high-resistance part such as a crack or the like, and has many pieces of conductive fine particles with specified diameters. Moreover, carbon or a carbon compound (graphite, amorphous carbon) is deposited on one part of the part 3, further on the film 4 in the vicinity of the section 3. Hereby, an electron emission element can be made, in which the control of the electron emission property, which was unclear in vacuum in the past, becomes possible and also the property becomes more staple than the initial stage of the drive of the electron emission element and besides the element current is small



and the efficiency is high.

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CLAIMS

[Claim(s)]
[Claim 1] The electron emission component characterized by having the deposit which uses carbon as a principal component at this high resistance section in the electron emission component which has the conductive film which contains the high resistance section in inter-electrode [which counters].
[Claim 2] The deposit which uses said carbon as a principal component is an electron emission component according to claim 1 which exists near this high resistance section further.
[Claim 3] The deposit which uses said carbon as a principal component is an electron emission component according to claim 2 which exists on said conductive film from said a part of high resistance section.
[Claim 4] The deposit which uses said carbon as a principal component is an electron emission component according to claim 3 which is unevenly distributed from said a part of high resistance section on the conductive film by the side of one electrode of said electrodes.
[Claim 5] The deposit which uses said carbon as a principal component is an electron emission component according to claim 4 which is unevenly distributed from said a part of high resistance section on the conductive film by the side of the high potential electrode of said electrodes.
[Claim 6] Said conductive film is an electron emission component according to claim 1 which consists of a conductive particle.
[Claim 7] Said conductive particle is an electron emission component according to claim 6 which is a metal or a metallic oxide.
[Claim 8] Said conductive particle is an electron emission component according to claim 6 by which the part is covered at least with said deposit.
[Claim 9] Said high resistance section is an electron emission component according to claim 1 which has a conductive particle.
[Claim 10] Said conductive particle is an electron emission component according to claim 9 by which the part is covered at least with said deposit.
[Claim 11] The deposit which uses said carbon as a principal component is an electron emission component according to claim 1 which covers said some of electrodes [at least].
[Claim 12] The deposit which uses said carbon as a principal component is an electron emission component according to claim 1 which are graphite, amorphous carbon, or those mixture.
[Claim 13] An electron emission current is an electron emission component according to claim 1 which has an increment property in monotone to the electrical potential difference impressed to inter-electrode [said].
[Claim 14] The electron source characterized by said electron emission component being an electron emission component according to claim 1 to 13 in the electron source which has an electron emission component and emits an electron according to an input signal.
[Claim 15] The electron source according to claim 14 which has two or more said electron emission components, and has the modulation means which modulates the electron ray to which the line of the electron emission component which connected each both ends of two or more of these electron emission components with wiring is emitted from this electron emission component with a multi-line.
[Claim 16] The electron source according to claim 14 which connects with the direction wiring of X of m and the direction wiring of n with which it has two or more said electron emission components, and these two or more electron emission components of each other were insulated electrically, and is installed.
[Claim 17] Image formation equipment which it has an electron source and an image formation member, and said electron source has an electron emission component in the image formation equipment which carries out image formation according to an input signal, and is characterized by this electron emission component being an electron emission component according to claim 1 to 13.
[Claim 18] Image formation equipment according to claim 17 said whose electron source is an electron source which

has two or more said electron emission components, and has the modulation means which modulates the electron ray to which the line of the electron emission component which connected each both ends of two or more of these electron emission components with wiring is emitted from this electron emission component with a multi-line.
[Claim 19] Image formation equipment according to claim 17 said whose electron source is an electron source which connects with the direction wiring of X of m and the direction wiring of n with which it has two or more said electron emission components, and these two or more electron emission components of each other were insulated electrically, and is installed.
[Claim 20] Image formation equipment according to claim 17 with which the emission current and the component current of said electron source have an increment property in monotone to component applied voltage.
[Claim 21] Image formation equipment according to claim 17 currently maintained by the degree of vacuum which prevents new deposition of the deposit with which the inside of image formation equipment uses said carbon as a principal component.
[Claim 22] The manufacture approach of the electron emission component characterized by having the activation process of a component in the manufacture approach of an electron emission component of having the conductive film which contains the electron emission section in inter-electrode [which counters].
[Claim 23] Said activation process is the manufacture approach of the electron emission component according to claim 22 which is the process on which said component is made to deposit the deposit which uses carbon as a principal component.
[Claim 24] Said activation process is the manufacture approach of an electron emission component according to claim 23 of having the process which impresses an electrical potential difference to the conductive film prepared in inter-electrode in the vacuum.
[Claim 25] Said electrical potential difference is the manufacture approach of the electron emission component according to claim 24 impressed by the shape of a pulse.
[Claim 26] Said electrical potential difference is the manufacture approach of the electron emission component according to claim 25 which is an electrical potential difference more than a voltage-controlled negative-resistance-characteristics field.
[Claim 27] Said electrical potential difference is the manufacture approach of the electron emission component according to claim 26 which is the driver voltage of an electron emission component.
[Claim 28] Furthermore, the manufacture approach of an electron emission component according to claim 22 of having a foaming process.
[Claim 29] Said foaming process is the manufacture approach of the electron emission component according to claim 28 which is the process which forms the high resistance section in the conductive film prepared in inter-electrode.
[Claim 30] Said activation process is the manufacture approach of the electron emission component according to claim 22 performed after said foaming process.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention is concerned with image formation equipments, such as a display which are an electron source and its application, and relates to image formation equipments, such as a new surface conduction mold electron emission component of a configuration, an electron source using it, and a display that is the application, especially.
[0002]
[Description of the Prior Art] Conventionally, two kinds, the source of a thermoelectron and a cold cathode electron source, are known as an electron emission component. There are an electron emission mold (it abbreviates to FE mold below), a metal / insulating layer / metal mold (it abbreviates to an MIM mold below), a surface conduction mold electron emission component, etc. in a cold cathode electron.
[0003] As an example of FE mold, they are W.P.Dyke&W.W.Dolan, "Fieldemission", and Advance. in Electron Physics, 8 and 89 (1956) or C.A.Spindt, "PHYSICALProperties of thin-filmfield emission cathodes with molybdenium cones", J.Appl.Phys., 47, 5248 (1976), etc. are known.
[0004] As an example of an MIM mold, they are C.A.Mead and "The. tunnel-emission amplifier, J.Appl.Phys., 32,646 (1961), etc. are known.
[0005] As an example of a surface conduction mold electron emission component, they are M.I.Elinson and RadioEng.Electron. There are Pys., 10, etc. (1965).
[0006] A surface conduction mold electron emission component uses the phenomenon which electron emission produces for the thin film of the small area formed on the substrate by passing a current in parallel to a film surface. As this surface conduction mold electron emission component, it is SnO2 by said Elinson etc. The thing using a thin film, Thing [G. depended on Au thin film Dittmer: "Thin Solid Films", 9,317(1972)], and In2 03 / SnO2 Thing [M. depended on a thin film Hartwe11 and C.G.Fonstad: "IEEE Trans.ED Conf.", What is depended on 519(1975)] and a carbon thin film [an Araki ****:vacuum, the 26th volume, No. 1, and 22 pages (1983)] is reported.
[0007] Above-mentioned M. Hartwell's component configuration is shown in drawing 18 as a typical component configuration of these surface conduction mold electron emission components. In this drawing, 1 is an insulating substrate. 2 is a thin film for electron emission section formation, it consists of a metallic-oxide thin film formed in the pattern of H mold configuration by the spatter, and the electron emission section 3 is formed of the energization processing called the below-mentioned foaming. 4 will call it the thin film containing the electron emission section. In addition, L1 in drawing is set up by 0.5-1mm, and W is set up by 0.1mm.
[0008] Conventionally, before performing electron emission in these surface conduction mold electron emission components, it was common to have formed the electron emission section 3 by energization processing beforehand called foaming in the thin film 2 for electron emission section formation. that is, with foaming, impression passage of the minute is carried out in direct current voltage or about ****** /, for example, 1v, carried out very slowly to the both ends of said thin film 2 for electron emission section formation, and the thin film for electron emission formation is destroyed, deformed or deteriorated locally -- making -- electric -- high -- it is forming the electron emission section 3 changed into the condition [****]. In addition, a crack generates the electron emission section 3 in some thin films 2 for electron emission section formation, and electron emission is performed from near [the] a crack. The thin film 2 for electron emission section formation containing the electron emission section formed by foaming below is called the thin film 4 containing the electron emission section. The surface conduction mold electron emission component which carried out said foaming processing impresses an electrical potential difference to the thin film 4 containing the above-mentioned electron emission section, and makes an electron emit from the above-mentioned electron emission section 3 by passing a current for a component.
[0009] However, in the surface conduction mold electron emission component of these former, although there were

various problems in utilization, these people etc. considered wholeheartedly various improvements which are mentioned later, and have solved various troubles on utilization.
[0010] An above-mentioned surface conduction mold electron emission component has the advantage to which structure can carry out array formation of the a large number component ranging from it being simple and manufacture being easy to a large area. Then, various application in which this description can be employed efficiently is studied. For example, the source of an electric charge beam, a display, etc. are raised.
[0011] As an example which carried out array formation of many surface conduction mold electron emission components, a surface conduction mold electron emission component is arranged to juxtaposition, and the electron source which carried out the line array of many lines which connected the both ends of each component with wiring, respectively is raised. (For example, JP,64-31332,A, JP,1-283749,A, JP,1-257552,A) Especially, in image formation equipments, such as a display, there is a trouble of having to have a back light etc., since it is not a spontaneous light type, although the monotonous mold display using liquid crystal has replaced and spread through CRT in recent years, and development of a spontaneous light type display has been desired again. It is the spontaneous light type display which could manufacture comparatively easily the image formation equipment which is a display which combined the fluorescent substance which makes the light emit light also with the equipment of a big screen, and was excellent in display grace with the electron emitted from the electron source which has arranged many surface conduction mold electron emission components, and the electron source (for example, USP No. 5066883).
[0012] In addition, selection of the component to which electron emission is carried out and luminescence of a fluorescent substance is carried out from the electron source which consisted of many surface conduction mold electron emission components conventionally Wiring which arranges and connected many above-mentioned surface conduction mold electron emission components to juxtaposition (it is called line writing direction wiring), It is based on the suitable driving signal to the control electrode (it is called the grid) and the direction wiring of a train which were installed in the direction which intersects perpendicularly with line wiring in the space between (it is called the direction of a train), this electron source, and a fluorescence pair (for example, JP,1-283749,A etc.).
[0013]
[Problem(s) to be Solved by the Invention] However, the behavior in the vacuum of the surface conduction mold electron emission component used for said electron source, image formation equipment, etc. was hardly found, but improvement in the stable and controlled electron emission characteristic and its effectiveness has been desired.
[0014] Effectiveness puts a current ratio with the current (it is hereafter called the emission current Ie) emitted into the vacuum over the flowing current (it is hereafter called the component current If) here, when an electrical potential difference is impressed to the component electrode with which the pair of a surface conduction mold electron emission component counters.
[0015] That is, a component current is small as much as possible, and the large thing of the emission current as much as possible is desirable.
[0016] It is stable, and if improvement in the electron emission characteristic and effectiveness which were controlled is made, in the image formation equipment which uses a fluorescent substance as an image formation member, for example, bright high-definition image formation equipment, for example, flat television, will be realized by low current. Moreover, it is also expectable that the drive circuit which constitutes image formation equipment becomes cheap with low-current-izing. In view of the above-mentioned problem, this invention is stable and is controlled, and a component current offers the electron source and image formation equipment using a new configuration, its manufacture approach, and it of an electron emission component with the small high effectiveness in which the emission current is large as it may be made as it may be made.
[0017]
[Means for Solving the Problem] The electron emission component of this invention which solves the above-mentioned technical problem In the electron emission component which has the conductive film which contains the high resistance section in inter-electrode [which counters] The deposit which is the electron emission component characterized by having the deposit which uses carbon as a principal component, and uses said carbon as a principal component preferably at this high resistance section It is the electron emission component which exists on said conductive film from said a part of high resistance section, and the deposit which uses said carbon as a principal component is an electron emission component which is unevenly distributed from said a part of high resistance section on the conductive film by the side of the high potential electrode of said electrodes still more preferably.
[0018] Moreover, the manufacture approach of the above-mentioned electron emission component is set to the manufacture approach of an electron emission component of having the conductive film which contains the electron emission section in inter-electrode [which counters]. Said activation process which is the manufacture approach of the electron emission component by which it is characterized, and says having the activation process of a component here Having the process on which said component is made to deposit the deposit which uses carbon as a principal

component, the above activation process has preferably the process which impresses an electrical potential difference to the conductive film prepared in inter-electrode in the vacuum.
[0019] Moreover, impression of this electrical potential difference is impression of a pulse-like electrical potential difference, and, as for this better **, it is good that it is the driver voltage of an electron emission component especially preferably.
[0020] This invention is an electron source which has the above electron emission component and emits an electron according to an input signal. Furthermore, preferably It is the electron source characterized by having arranged two or more above-mentioned electron emission components on a base. The line of the electron emission component which has arranged two or more two or more electron emission components to juxtaposition, and connected the both ends of each component to the base at wiring Two or more rice cake, the arrangement gestalt which has the modulation means further, Or it is the electron source which has mutually the arrangement gestalt which arranged two or more electron emission components which connected the component electrode of the pair of this electron emission component to the direction wiring of X of m and the direction wiring of Y of n which were insulated electrically in a base.
[0021] Furthermore, this invention is image formation equipment and is image formation equipment characterized by ** which has an image formation member and the electron source of said this invention at least in the image formation equipment which forms an image based on an input signal.
[0022] Below, the desirable embodiment of this invention is described.
[0023] First, the fundamental configuration of the surface conduction mold electron emission component concerning this invention is explained.
[0024] (a) of drawing 1 and (b) are the top views and sectional views showing the configuration of the surface conduction mold electron emission component of the fundamental flat-surface mold in connection with this invention, respectively. The fundamental configuration of the component concerning this invention is explained using drawing 1 .
[0025] The thin film (conductive film) with which a substrate, and 5 and 6 contain a component electrode and, as for 4, 1 contains the electron emission section in drawing 1 , and 3 are the electron emission sections.
[0026] It is SiO2 which formed impurity contents, such as quartz glass and Na, in the glass which decreased in number, blue plate glass, and blue plate glass by the spatter etc. as a substrate 1. Ceramics, such as aluminas, such as a glass substrate which carried out the laminating, etc. is mentioned.
[0027] Although you may be what kind of thing as long as it has conductivity as an ingredient of the component electrodes 5 and 6 which counter For example, metals, such as nickel, Cr, Au, Mo, W, Pt, Ti, aluminum, Cu, and Pd, or an alloy, and Pd, the printed conductor which consists of a metal or a metallic oxide, glass, etc., such as Ag, Au, RuO2, and Pd-Ag, and In2 O3-SnO2 etc. -- semiconductor materials, such as a transparence conductor and polish recon, etc. are mentioned.
[0028] The pixel size corresponding to [are the indicating equipment which the configuration of the component electrode spacing L1, the component electrode die length W1, and the conductive film 4 etc. is suitably designed according to the application gestalt of this component etc., for example, is mentioned later, and] a screen size with television is designed, and it divides, and pixel size is small and high definition TV requires highly minute. Therefore, while being limited, in order for the size of an electron emission component to obtain sufficient brightness, it is designed so that sufficient emission current may be acquired.
[0029] The component electrode spacing L1 is 10 micrometers of numbers from several micrometers preferably, although the photolithography technique which is from hundreds of A to the base of the process of those with 100 micrometers of numbers and a component electrode, i.e., engine performance, the etching approach, etc. of an exposure machine, is set up with the field strength which can carry out electron emission to the electrical potential difference impressed to component inter-electrode.
[0030] The die length W1 of a component electrode and the thickness d of the component electrodes 5 and 6 are suitably designed from the problem on connection with the resistance of an electrode, X, and Y wiring which were mentioned above, and arrangement of the electron source by which a large number arrangement was carried out, the die length W1 of a component electrode is 100 micrometers of numbers from several micrometers, and the thickness d of the component electrodes 5 and 6 is usually several micrometers from hundreds of A.
[0031] Although between the component electrode 5 which was prepared on the substrate 1 and which counters, and the component electrode 6 and the component electrode 5, and the thin film 4 containing the electron emission section installed 6 top contain the electron emission section 3, they may not be installed not only when shown in (b) of drawing 1 , but on the component electrode 5 and 6. That is, it is the case where a laminating configuration is carried out on the insulating substrate 1 at the order of the thin film 2 for electron emission section formation, and the component electrodes 5 and 6 which counter. Moreover, all component electrode [which counters] 5, and component electrode 6 rooms may function as the electron emission section depending on a process. The thickness of the thin film 4 containing this electron emission section is preferably set [angstroms / several] up suitably from 10A especially

preferably by 1000A of numbers according to the resistance between the step coverage to those with 500A, and the component electrodes 5 and 6, the electron emission section 3 and the component electrode 5, and 6 and the particle size of the conductive particle of the electron emission section 3, the energization processing conditions mentioned later. The resistance shows the sheet resistance of the 7th power ohm / ** of 10 from the cube of 10.

[0032] If the example of the ingredient which constitutes the thin film (conductive film) 4 containing the electron emission section is given, Pd, Ru, Ag, Au, Ti, In, Cu, Cr, Fe, Zn, Sn, Ta, Metals, such as W and Pb, PdO and SnO2, In 2O3, PbO, Sb 2O3 etc. -- an oxide, HfB2, ZrB2, and LaB6 -- CeB6, YB4, and GdB4 etc. -- it is semi-conductors, such as nitrides, such as carbide, such as boride, and TiC, ZrC, HfC, TaC, SiC, WC, and TiN, ZrN, HfN, and Si, germanium, carbon, AgMg, NiCu, Pb, Sn, etc., and consists of a particle.

[0033] In addition, the particle film described here is film with which two or more particles gathered, and not only the condition that the particle distributed separately but a particle puts mutually the film in contiguity or the condition (the shape of an island is also included) of having overlapped, as the fine structure.

[0034] In several angstroms, the particle size of a particle is 1000A of numbers, and this better ** is 200A from 10A.

[0035] For example, the electron emission section 3 was formed in some conductive film 4, it is the high resistance sections, such as a crack, and still more preferably, from several angstroms, 100A of numbers, it is dependent on processes, such as thickness of the thin film (conductive film) 4 which may have conductive particle many with a particle size of 500A, and contains the electron emission section, and energization processing conditions mentioned later, from 10A, and is set up especially suitably preferably.

[0036] Moreover, said conductive particle is the same object as all the all [some or] of the ingredient which constitutes the thin film (conductive film) 4 containing the electron emission section.

[0037] Moreover, carbon or a carbon compound has accumulated on the conductive film 4 near a part of electron emission section 3 and also the electron emission section 3.

[0038] Next, the vertical-type surface conductivity-type electron emission component which is a surface conduction mold electron emission component of another configuration of starting this invention is explained.

[0039] Drawing 12 is a typical drawing in which the configuration of a fundamental vertical-type surface conduction mold electron emission component is shown.

[0040] In drawing 12 , the thing of the same sign as drawing 1 is the same. 21 is the **** formation section. A substrate 1, the component electrodes 5 and 6, the thin film 4 containing the electron emission section, and the electron emission section 3 It consists of the same ingredients as the flat-surface mold surface conduction mold electron emission component mentioned above. The **** formation section 21 It consists of insulating ingredients of the SiO2 grade formed by the vacuum deposition method, print processes, a spatter, etc. Although it corresponds to the component electrode spacing L of the flat-surface mold surface conduction mold electron emission component described previously, and the thickness of the **** formation section 21 is 10 micrometers of numbers and is set up from dozens of nanometers with the field strength which can carry out electron emission to the process of the **** formation section, and the electrical potential difference impressed to component inter-electrode Preferably, it is several micrometers from dozens of nanometers. In order to form the thin film 4 containing the electron emission section after the component electrodes 5 and 6 and **** formation section 21 creation, the laminating of it is carried out on the component electrodes 5 and 6. In addition, in drawing 12 , although the electron emission section 3 is shown in the level difference formation section 21 in the shape of a straight line, it does not restrict a configuration and a location to this depending on creation conditions, energization foaming conditions, etc.
 [0041] Although various approaches as the manufacture approach of an electron emission component of having the electron emission section 3 can be considered, the example is shown in drawing 2 . In addition, as for two, for example, the particle film is mentioned with the thin film for electron emission section formation (conductive film) among drawing 2 .

[0042] Hereafter, explanation of the manufacture approach is explained for order based on drawing 1 and drawing 2 later on.

1) By the detergent, pure water, and the organic solvent, form the component electrode material deposition-back by the vacuum deposition method, a spatter, etc. after washing, and fully form the component electrodes 5 and 6 for a substrate 1 on the field of this insulating substrate 1 with a photolithography technique ((a) of drawing 2).

2) Form an organic metal thin film by applying and leaving an organic metal solution on the insulating substrate in which the component electrodes 5 and 6 were formed between the component electrodes 5 and the component electrodes 6 which were prepared on the insulating substrate 1. In addition, an organic metal solution is a solution of the organic compound which uses said metals, such as Pd, Ru, Ag, Au, Ti, In, Cu, Cr, Fe, Zn, Sn, Ta, W, and Pb, as the main element. Then, heating baking processing of the organic metal thin film is carried out, patterning is carried out by lift off, etching, etc., and the thin film 2 for electron emission section formation is formed ((b) of drawing 2). In addition, although it explains by the method of applying an organic metal solution, it is not the object restricted to this and may be formed here by vacuum evaporation technique, a spatter, modified chemical vapor deposition, the

distributed applying method, the dipping method, the spinner method, etc.
3) It continues, and if the shape of a pulse and energization processing by ****** are performed by the power source whose electrical potential difference is not illustrated for the energization processing called foaming between the component electrode 5 and 6, the electron emission section 3 from which structure changed will be formed in the part of the thin film 2 for electron emission section formation (conductive film) ((c) of drawing 2). The thin film 2 for electron emission section formation (conductive film) is made to break, deform or deteriorate locally by this energization processing, and the part (high resistance part) where structure changed is called the electron emission section 3.
[0043] Electrical treatment after foaming processing is performed within the measurement evaluation equipment shown in drawing 3 . Measurement evaluation equipment is explained below.
[0044] Drawing 3 is the outline block diagram of the measurement evaluation equipment for measuring the electron emission characteristic of the component which has the configuration shown by drawing 1 . In drawing 3 , the thin film with which a base, and 5 and 6 contain a component electrode, and, as for 4, 1 contains the electron emission section, and 3 show the electron emission section. Moreover, a high voltage power supply for an anode electrode for an ammeter for a power source for 31 to impress the component electrical potential difference Vf to a component and 30 to measure the component current If which flows the component electrode 5 and the thin film 4 containing the electron emission section between six, and 34 to catch the emission current Ie emitted from the electron emission section of a component, and 33 to impress an electrical potential difference to the anode electrode 34, and 32 are the ammeters for measuring the emission current Ie emitted from the electron emission section 3 of a component.
[0045] In measurement of the above-mentioned component current If of an electron emission component, and the emission current Ie, the anode electrode 34 which connected the power source 31 and the ammeter 30 to the component electrodes 5 and 6, and connected the power source 33 and the ammeter 32 above this electron emission component is arranged. Moreover, an electron emission component and the anode electrode 34 are installed in vacuum devices, and the device required for vacuum devices, such as a non-illustrated exhaust air pump and a vacuum gage, possesses them in the vacuum devices, and they can perform measurement evaluation of a component now under a desired vacuum. In addition, an exhaust air pump consists of an ultra-high-vacuum equipment system which turns into further high vacuum equipment systems which do not use the usual high vacuum equipment system which consists of a turbine pump and a rotary pump, or oil, such as a magnetic levitation turbine pump and a dry pump, from an ion pump. Moreover, the whole vacuum devices and an electron source substrate can be heated to 200 degrees C at a non-illustrated heater.
[0046] In addition, the electrical potential difference of an anode electrode measured the distance H of 1kV - 10kV, an anode electrode, and an electron emission component in 2mm - 8mm.
[0047] Foaming processing may impress an electrical-potential-difference pulse, making the case where a pulse height value impresses the pulse of a constant voltage, and a pulse height value increase. First, the voltage waveform in a pulse height value's impression of the pulse of a constant voltage is shown in (a) of drawing 4 .
[0048] T1 and T2 are the pulse width and pulse separations of a voltage waveform among (a) of drawing 4 , T1 is made into 1 microsecond - 10 mses, they make T2 10 microseconds - 100 mses, and the peak value (peak voltage at the time of foaming) of a triangular wave is chosen suitably, and is impressed under a vacuum ambient atmosphere.
[0049] Next, the voltage waveform in the case of impressing an electrical-potential-difference pulse is shown in (b) of drawing 4 , making a pulse height value increase.
[0050] the inside of (b) of drawing 4 , and T1 and T2 -- the pulse width of a voltage waveform, and pulse separation -- it is -- T1 -- 1 microsecond - 10 mses, and T2 -- 10 microseconds - 100 mses -- carrying out -- the peak value (peak voltage at the time of foaming) of a triangular wave -- every [for example, / 0.1V step extent] -- it is made to increase and impresses under a vacuum ambient atmosphere.
[0051] In addition, termination of foaming processing was, the electrical potential difference of extent, for example, the about [0.1V] electrical potential difference, which does not destroy and deform locally the thin film 2 for electron emission section formation into pulse separation T2, and when a component current was measured, and resistance was calculated, for example, resistance beyond 1M ohm was shown, it considered foaming as termination. The electrical potential difference at this time is made to call it the foaming electrical potential difference Vform.
[0052] Although a triangular wave pulse is impressed to inter-electrode [of a component] and foaming processing is performed in case the electron emission section explained above is formed The wave impressed to inter-electrode [of a component] may not be limited to a triangular wave, and the wave of requests, such as a square wave, may be used. Without restricting to an above-mentioned value also about the peak value and pulse width, and pulse separation, in accordance with the resistance of an electron emission component etc., a desired value is chosen so that the electron emission section may be formed good.
[0053] Moreover, making a pulse height value as shown in (b) of above-mentioned drawing 4 increase, since it is uniquely decided by the ingredient of a component, a configuration, etc., since the energy of foaming with the direction

proper for each component in the case of impressing an electrical-potential-difference pulse is obtained easily and the good electron emission characteristic is acquired, this foaming electrical potential difference is desirable.
4) Next, perform processing called activation to the component which foaming ended. Activation is the degree of vacuum of 5th power torr extent of minus [power / of minus of 10 / 4th / -] of 10, and is processing to which it is depositing carbon or a carbon compound, and the component current If and the emission current Ie change from the organic substance with which a pulse height value says the thing of processing which winds and returns impression of the pulse of a constant voltage, and exists in a vacuum like foaming remarkably. Measuring the component current If and the emission current Ie, when the emission current Ie is saturated, activation is ended, for example. The example of an activation time-dependent of the component current If and the emission current Ie is shown in drawing 5 .
[0054] Depending on the pulse voltage which impresses activation to a degree of vacuum and a component, the time-dependent of this component current If and the emission current Ie changes, and deformation and the formation condition of the coat (deposit) to the thin film which deteriorated change with foaming processings.
[0055] Suppose that the case where an activation electrical potential difference impresses and carries out activation of the pulse high enough compared with the foaming electrical potential difference Vform is called high resistance activation. On the other hand, suppose that the case where an activation electrical potential difference impresses and carries out activation of the pulse low enough compared with the foaming electrical potential difference Vform is called low resistance activation. In addition, activation is correctly classified mostly as a boundary in the starting potential VP which shows the voltage-controlled negative resistance mentioned later.
[0056] Although gestalt change of the component in the case of high resistance activation and low resistance activation was observed, mimetic diagrams are (a) of drawing 6 , and (b). In addition, FESEM, TEM, etc. performed the above-mentioned observation.
[0057] (a) of drawing 6 and (b) are the cross sections of high resistance activation and the component at the time of carrying out low resistance activation, respectively. In addition, impression of an electrical potential difference was performed by using 6 as a low voltage lateral electrode, having used 5 as the high potential lateral electrode. In (a) of drawing 6 which shows the case of high resistance activation, carbon or a carbon compound 61 has accumulated by foaming mainly on the conductive film 4 by the side of the high potential electrode 5 from a part of part (high resistance part) 3 which cheated out of deformation of a crack etc., and deterioration on the conductive film 4. Furthermore, if it observes for a high scale factor, it will have deposited also on the outskirts also of a perimeter and the outskirts of a particle. Moreover, it is based on the component inter-electrode distance which counters, and carbon or a carbon compound 61 may accumulate also on a component electrode. 500A or less of the thickness is 300A or less more preferably.
[0058] In addition, carbon or a carbon compound is graphite (both ** and polycrystal are pointed out) and amorphous carbon (mixture with amorphous carbon and polycrystal graphite is pointed out) here as a result of TEM, Raman, etc.
[0059] On the other hand, in (b) of drawing 6 which shows the case of low resistance activation, carbon or a carbon compound 61 has accumulated on a part of deformation and part 3 made to deteriorate by foaming. Furthermore, if it observes for a high scale factor, it will have deposited also on the outskirts also of a perimeter and the outskirts of a particle.
[0060] In addition, with carbon or a carbon compound, they are graphite (both ** and polycrystal are pointed out) and amorphous carbon (mixture with amorphous carbon and polycrystal graphite is pointed out) like the point here as a result of TEM, Raman, etc.
5) In this way, drive the created electron emission component preferably in the vacuum ambient atmosphere of a degree of vacuum higher than foaming processing and the degree of vacuum which carried out activation. Moreover, the vacuum ambient atmosphere of a degree of vacuum higher than foaming processing and the degree of vacuum which carried out activation is a degree of vacuum which has a degree of vacuum more than the 6th power of the minus torr of about ten preferably, and is a degree of vacuum which is an ultra-high-vacuum system and is not newly [carbon and a carbon compound] deposited mostly more preferably.
[0061] Therefore, by this, it becomes possible to control deposition of the carbon beyond this, and a carbon compound, and the component current If and the emission current Ie are stabilized uniformly.
[0062] In addition, with the component in the case of high resistance activation and low resistance activation, the stability in the early stages of a drive differs, and high resistance activation is more preferably chosen as activation.
[0063] The basic property of the electron emission component in connection with this invention created by the above component configurations and the manufacture approach is explained using drawing 3 and drawing 7 .
[0064] The typical example of the relation between the emission current Ie and the component current If which were measured by the measurement evaluation equipment shown in drawing 3 , and the component electrical potential difference Vf is shown in drawing 7 . In addition, since the emission current Ie is remarkably small compared with the component.current If, drawing 7 is shown per arbitration. This electron emission component has three properties over

the emission current Ie so that clearly also from drawing 7 .
[0065] First, if this component impresses the component electrical potential difference more than a certain electrical potential difference (Vth in drawing 7 called a threshold electrical potential difference), the emission current Ie will increase rapidly and, on the other hand, the emission current Ie will hardly be detected below on the threshold electrical potential difference Vth by the 1st. That is, it is a nonlinear device with the clear threshold electrical potential difference Vth to the emission current Ie.
[0066] Since the emission current Ie is [2nd] dependent on the component electrical potential difference Vf, the emission current Ie is controllable by the component electrical potential difference Vf.
[0067] It depends for the emission charge caught by the anode electrode 34 the 3rd on the time amount which impresses the component electrical potential difference Vf. That is, the amount of charges caught by the anode electrode 34 is controllable by the time amount which impresses the component electrical potential difference Vf.
[0068] On the other hand, although the component current If may show the property (continuous line of drawing 7) and voltage-controlled negative resistance (it is called VCNR property) property (broken line of drawing 7) which carry out the increment in monotone to the component electrical potential difference Vf (it is called MI property), it depends for the property of these components current on the process. Moreover, the boundary electrical potential difference which shows a VCNR property is called ****.
[0069] The VCNR property of the component current If is the usual vacuum-devices system, and when foaming is performed, it generates. Namely, the property The vacuum ambient atmosphere conditions of the electric conditions at the time of foaming, and a vacuum-devices system etc., Or the vacuum ambient atmosphere conditions of the vacuum-devices system at the time of measurement of the electron emission component which already performed foaming, the electric Measuring condition at the time of measurement (for example, in order to acquire the current-voltage characteristic of an electron emission component) It became clear that it changed a lot depending on the neglect time amount in vacuum devices of the electron emission component of the time of measurement, such as a trace speed when carrying out the sweep of the electrical potential difference impressed to a component from a low battery to the high voltage, etc. Moreover, the emission current Ie shows MI property at this time.
[0070] Since it has an increment property in monotone over the component applied voltage of the property If of the above surface conduction mold electron emission components, i.e., a component current, and the emission current Ie, the electron emission component in connection with this invention can expect the application to the direction of many.
[0071] In addition, in the surface conduction mold electron emission component which distributed and constituted the conductive particle beforehand, the part of the fundamental manufacture approaches of the fundamental component configuration of said this invention may be changed.
[0072] Although the fundamental configuration of a surface conduction mold electron emission component and the process were described above, if it has three above-mentioned descriptions in the property of a surface conduction form electron emission component according to the thought of this invention, it is not limited to an above-mentioned configuration etc., but can apply also in image formation equipments, such as the below-mentioned electron source and a display.
[0073] Next, the electron source and image formation equipment of this invention are described.
[0074] Two or more electron emission components of this invention are arranged on a substrate, and an electron source or image formation equipment can be constituted.
[0075] Many surface conduction mold electron emission components stated to the method of the array on a substrate for example, in the conventional example are arranged to juxtaposition. Many lines of the electron emission component which connected the both ends of each component with wiring are arranged (it is called a line writing direction). The array gestalt which carries out the control drive of the electron with the control electrode (it is called a grid) installed in the direction which intersects perpendicularly with this wiring in the upper space of (it is called the direction of a train), and this electron source (henceforth) And it calls it a ladder mold, the direction wiring of Y of n is installed through a layer insulation layer after the direction wiring of X of m described below, and the array gestalt which connected the direction wiring of X and the direction wiring of Y to the component electrode of the pair of a surface conduction form electron emission component, respectively is mentioned. This is henceforth called passive-matrix arrangement.
[0076] Next, this passive matrix is explained in full detail.
[0077] According to the description of three fundamental properties which the surface conduction mold electron emission component in connection with this invention mentioned above, the emission electron from a surface conduction mold electron emission component is controlled by the peak value and width of a pulse-like electrical potential difference which are impressed to the component inter-electrode which counters above a threshold electrical potential difference. On the other hand, it is hardly emitted below on a threshold electrical potential difference. If the above-mentioned pulse-like electrical potential difference is suitably impressed to each component when many electron emission components have been arranged according to this property, according to an input signal, a surface conduction

mold electron emission component will be chosen, and that amount of electron emission can be controlled.
[0078] Hereafter, the configuration of the electron source substrate constituted based on this principle is explained using drawing 8 .
[0079] The direction wiring 82 of X of m consists of DX1, DX2, --DXm, it forms by the vacuum deposition method, print processes, a spatter, etc. on the insulating substrate 1, and consists of a conductive metal considered as the desired par turn, and an ingredient, thickness, and wiring width are set as the appearance by which an almost equal electrical potential difference is supplied to many surface conduction mold electron emission components. The direction wiring 83 of Y consists of DY1, DY2, and wiring of n of --DYn, like the direction wiring 82 of X, it forms by the vacuum deposition method, print processes, a spatter, etc., and consists of a conductive metal considered as the desired par turn, and an ingredient, thickness, wiring width, etc. are set as the appearance by which an almost equal electrical potential difference is supplied to many surface conduction mold electron emission components. A non-illustrated layer insulation layer is installed between the direction wiring 82 of X and the direction wiring 83 of Y of n of these m, it dissociates electrically, and matrix wiring is constituted (this m and n are [both] a positive integer).
[0080] SiO2 in which the non-illustrated layer insulation layer was formed by the vacuum deposition method, print processes, a spatter, etc. etc. -- it is -- it is formed in the whole surface or some of insulating substrate 1 in which the direction wiring 82 of X was formed, in a desired configuration, and thickness, an ingredient, and a process are suitably set up so that the potential difference of the intersection of the direction wiring 82 of X and the direction wiring 83 of Y can be borne especially. The direction wiring 82 of X and the direction wiring 83 of Y are pulled out as an external terminal, respectively.
[0081] Furthermore, the electrode (un-illustrating) with which the surface conduction mold electron emission component 84 counters is electrically connected like the above-mentioned by the direction wiring 82 (DX1, DX2, --DXm) of X of m, the direction wiring 83 (DY1, DY2, --DYn) of Y of n, and the connection 85 that consists of a conductive metal formed by the vacuum deposition method, print processes, a spatter, etc.
[0082] The conductive metal of m the direction wiring 82 of X, the direction wiring 83 of Y of n and connection 85, and the component electrode which counters here Some or all of the configuration element may be the same, or may differ, respectively. Metals, such as nickel, Cr, Au, Mo, W, Pt, Ti, aluminum, Cu, and Pd, or an alloy, and Pd, the transparence of the printed conductor which consists of a metal or a metallic oxide, glass, etc., such as Ag, Au, RuO2, and Pd-Ag, and In2O3-SnO2 grade -- it is suitably chosen from semiconductor materials, such as a conductor and polish recon, etc. Moreover, a surface conduction mold electron emission component may be formed in whichever on the insulating substrate 1 or a non-illustrated layer insulation layer.
[0083] Moreover, in detail, although mentioned later In said direction wiring 82 of X, the line of the surface conduction mold electron emission component 84 arranged in the direction of X It connects with a scan signal impression means by which it does not illustrate for impressing the scan signal for scanning according to an input signal, electrically. On the other hand, for the direction wiring 83 of Y It connects with a modulating-signal generating means by which it does not illustrate for impressing the modulating signal for modulating each train of the train of the surface conduction mold electron emission component 84 arranged in the direction of Y according to an input signal, electrically.
[0084] Furthermore, the driver voltage impressed to each component of a surface conduction mold electron emission component is supplied as a difference electrical potential difference of the scan signal impressed to the component concerned, and a modulating signal.
[0085] Next, the image formation equipment used for the electron source using the electron source substrate created as mentioned above, a display, etc. is explained using drawing 9 and drawing 10 . Drawing 9 is the basic block diagram of image formation equipment, and drawing 10 is a fluorescent screen.
[0086] In drawing 9 , the face plate with which, as for the rear plate with which 1 fixed the substrate and 91 fixed the substrate 1, and 96, the fluorescent screen 94 and the metal back 95 grade were formed in the inside of a glass substrate 93, and 92 are housings, they are applying frit glass etc. and calcinating it 10 minutes or more at 400-500 degrees C in atmospheric air or nitrogen, seal the rear plate 91, a housing 92, and a face plate 96, and constitute an envelope 98.
[0087] In drawing 9 , 84 is equivalent to the surface conduction mold electron emission component shown in drawing 1 or drawing 12 . 82 and 83 are the direction wiring of X and the direction wiring of Y which were connected with the component electrode of the pair of a surface conduction form electron emission component. Moreover, it may be called a component electrode when wiring to these components electrode has a component electrode and the same wiring material.
[0088] Although the envelope 98 was constituted from a face plate 96, a housing 92, and a rear plate 91 like ****, since the rear plate 91 is formed in order to mainly reinforce the reinforcement of a substrate 1, when it has reinforcement sufficient by substrate 1 the very thing, the rear plate 91 of another object of the envelope 98 is unnecessary, it seals the direct housing 92 in a substrate 1, and may constitute an envelope 98 from a face plate 96, a housing 92, and a substrate 1.

[0089] Drawing 10 is a fluorescent screen. In the case of monochrome, it consists only of a fluorescent substance, but in the case of the fluorescent screen of a color, a fluorescent screen 94 consists of the black **** material 101 and fluorescent substances 102 which are called a black stripe or a black matrix by the array of a fluorescent substance. The purposes in which a black stripe and a black matrix are prepared are it not being conspicuous and carrying out color mixture etc. by distinguishing by different color between each fluorescent substance 102 of the three-primary-colors fluorescent substance which is needed in the case of color display with, and making the section black, and controlling the fall of the contrast by the outdoor daylight reflection in a fluorescent screen 94. There is not only the ingredient that uses as a principal component the graphite usually well used as an ingredient of a black stripe but conductivity, and if transparency and reflection of light are few ingredients, it will not restrict to this.
[0090] The approach of applying a fluorescent substance to a glass substrate 93 is not based on monochrome and a color, but settling and print processes are used.
[0091] Moreover, the metal back 95 is usually formed in the inside side of a fluorescent screen 94. The metal back's purpose is protection of the fluorescent substance from the damage by the collision of the anion generated within acting as an electrode for impressing improving brightness and electron beam acceleration voltage and an envelope etc. by carrying out specular reflection of the light by the side of an inside to a face plate 96 side among generating of a fluorescent substance. The metal back performs data smoothing (usually called filming) of the inside side front face of a fluorescent screen after fluorescent screen production, and it can produce by depositing A1 with vacuum deposition etc. after that.
[0092] In order to raise the conductivity of a fluorescent screen 94 to a face plate 96 further, a transparent electrode (un-illustrating) may prepare in the external surface side of a fluorescent screen 94.
[0093] In case the above-mentioned sealing is performed, in order to have to make each color fluorescent substance and an electron emission component correspond, in the case of a color, it is necessary to perform sufficient alignment.
[0094] An envelope 98 is made into the about [a minus 6 power torr] degree of vacuum of 10 through a non-illustrated exhaust pipe, and the closure of an envelope 98 is performed.
[0095] In addition, the component of drawing 1 which formed the electron emission section as mentioned above, or drawing 12 an electron source substrate Although it arranges and wired like the above on the substrate, preferably The component before electron emission section formation, On a substrate the component in the condition of having been carried out by making it (b) of drawing 2 , like the above For example, arrangement, Wire, and after arranging this in the envelope 98 shown in drawing 9 , a non-illustrated exhaust pipe is led. By the usual vacuum-devices system which makes a rotary pump and a turbine pump a pump system, for example, the inside of this envelope Consider as the about [a minus 6 power torr] degree of vacuum of 10, and an electrical potential difference is impressed between the component electrode 5 and 6 ((b) of drawing 2) through the container outer edge child Dox1 thru/or Doxm, Doy1, or Doyn. By performing above-mentioned foaming, next performing the inside of this envelope for said activation as an about [a minus 6 power torr] degree of vacuum of ten, the electron emission section 3 is formed and an electron source substrate is produced.
[0096] It changes with the ultra-high-vacuum equipment system made into pump systems, such as an ion pump, after production as mentioned above, for example, performing baking at 80 - 150 degrees after that especially for 3 to 15 hours. The change of an ultra-high-vacuum system and baking are for satisfying the increment property in monotone of the component current If of the above-mentioned surface conduction mold electron emission component, and the emission current Ie (MI property), and the approach and conditions are not restricted to this. Moreover, getter processing may be performed in order to maintain the degree of vacuum after the closure of an envelope 98. This is processing which heats the getter arranged at the position in an envelope 98 (un-illustrating), and forms the vacuum evaporationo film by the heating methods, such as resistance heating or high-frequency heating, after the closure, just before performing the closure of an envelope 98. Ba etc. is usually a principal component and a getter maintains the degree of vacuum of the 5th power of 1x10 minus, and the 7th power of 1x10 minus [Torr] by the absorption of this vacuum evaporationo film.
[0097] Through the container outer edge child Dox1 thru/or Doxm, Doy1, or Doyn, by impressing an electrical potential difference, carry out electron emission, and impress the high pressure of several kV or more to the metal back 95 or a transparent electrode (un-illustrating) through a secondary terminal Hv, accelerate an electron beam for each electron emission component, it is made to collide with a fluorescent screen 94 for it, and an image is displayed on it by making light excite and emit in the image display device of this invention completed by the above.
[0098] The configuration described above is an outline configuration required when producing the suitable image formation equipment used for a display etc., for example, detailed parts, such as an ingredient of each part material, are not restricted to the above-mentioned contents, and they are suitably chosen so that it may be suitable for the application of image equipment.
[0099]

[Example] An example is raised to below and this invention is explained further in full detail.
[0100] (Example 1) The configuration of the fundamental surface conduction mold electron emission component in connection with this invention is the same as that of the top view of (a) of drawing 1 , and (b), and a sectional view.
[0101] In addition, on the substrate 1, as the component of the same configuration shows drawing 11 , four pieces are formed. In addition, in drawing 11 , the thing of the same number as drawing 1 shows the same thing.
[0102] The manufacturing method of the surface conduction form electron emission component concerning this invention is the same as that of drawing 2 fundamentally. Hereafter, the fundamental configuration and fundamental manufacturing method of a component concerning this invention are explained using drawing 1 and drawing 2 .
[0103] In drawing 1 , the thin film with which a substrate, and 5 and 6 contain a component electrode and, as for 4, 1 contains the electron emission section, and 3 are the electron emission sections.
[0104] Hereafter, explanation of the manufacture approach is explained for order based on drawing 1 and drawing 2 later on.
[0105] Process-a: The pattern which should serve as the component electrode 5 and the component inter-electrode gap G was formed by the photoresist (RD-2000N-41 Hitachi Chemical Co., Ltd. make) on the substrate 1 which formed silicon oxide with a thickness of 0.5 microns by the spatter on the defecated blue plate glass, and the sequential deposition of Ti with a thickness of 50A and the 1000Anickel in thickness was carried out with the vacuum deposition method. The photoresist pattern was dissolved by the organic solvent, lift off of the nickel/Ti deposition film was carried out, the component electrode spacing G was made into 3 microns, and the component electrodes 5 and 6 which have 300 microns for the width of face W1 of a component electrode were formed ((a) of drawing 2).
[0106] Process-b: The Cr film 121 of 1000A of thickness was carried out deposition and patterning vacuum deposition with the mask which has opening in electrode gap between components G, and this near, and heating baking processing for 10 minutes was carried out for organic [Pd] (ccp4230 Okuno Pharmaceuticals company make) at rotation spreading and 300 degrees C with the spinner on it. Moreover, the thickness of the thin film 2 for electron emission section formation which consists of a particle which consists of Pb as a main element formed in this way was 100A, and sheet resistance was 4th power omega /** of 2x10. In addition, as the particle film described here was mentioned above, it is the film with which two or more particles gathered, and not only the condition that the particle distributed separately but a particle puts mutually contiguity or the film in the condition (the shape of an island is also included) of having overlapped, as the fine structure, and the particle size means the path about the particle which can recognize particle shape in said condition.
[0107] The process-c:Cr film and the thin film 2 for electron emission section formation after baking were etched by acid etchant, and the desired pattern was formed. The component electrodes 5 and 6 and the thin film 2 grade for electron emission section formation were formed on the substrate 1 according to the above process ((b) of drawing 2).
[0108] After having installed in process-d:, next the measurement evaluation equipment of drawing 3 , exhausting with the vacuum pump and reaching the degree of vacuum of the 5th power of the minus torr of 2x10, between each component electrode 5 and 6, the electrical potential difference was impressed, respectively and four elements [power source / 31 / for impressing the component electrical potential difference Vf to a component] carried out energization processing (foaming processing). The voltage waveform of foaming processing is shown in (b) of drawing 4 .
[0109] T1 and T2 were the pulse width and pulse separations of a voltage waveform among (b) of drawing 4 , in this example, T1 was made into 1 ms, they made T2 10 mses, the pressure up of the peak value (peak voltage at the time of foaming) of a square wave was carried out at 0.1V step, and it performed foaming processing. Moreover, during foaming processing, to coincidence, it was the electrical potential difference of 0.1V, and the resistance measurement pulse was inserted among T2, and resistance was measured. in addition, termination of foaming processing -- the measured value in a resistance measurement pulse -- about 1 -- it considered as the time of becoming M ohms or more, and impression of the electrical potential difference to a component was ended to coincidence. The foaming electrical potential differences Vform of each component were 5.1V, 5.0V, 5.0V, and 5.15V.
[0110] To process-e:, then four elements which carried out foaming processing, peak value of a square wave was carried out by the wave of (b) of drawing 4 , and activation was carried out by 4V and every two 14 V each, respectively. The component sample which carried out activation by Component A and high resistance activation, 14V [i.e.,], for low resistance activation, i.e., the component sample which carried out activation by 4V, will be called Component B.
[0111] With activation, the pulse voltage was impressed to the appearance mentioned above within the measurement evaluation equipment of drawing 3 component inter-electrode, measuring the component current If and the emission current Ie. In addition, the degree of vacuum in the measurement evaluation equipment of drawing 3 was the 5th power of the minus torr of 1.5x10 at this time. Activation was ended in about 30 minutes.
[0112] In this way, the electron emission section 3 was formed and the electron emission component was produced.
[0113] In order to grasp the property and gestalt of a surface conduction form electron emission component which were

produced at the above-mentioned process, the measurement evaluation equipment of above-mentioned drawing 3 was used for the above-mentioned components A and B, and measurement of the one-piece each every electron emission characteristic was performed. Moreover, every one remaining pieces were observed with the electron microscope.
[0114] In addition, the degree of vacuum in 1kV and the vacuum devices at the time of electron emission characteristic measurement was carried out [the distance between electron emission components] for the potential of 4mm and an anode electrode to the anode electrode the 6th power of the minus torr of 1x10. Components A and B impressed the component electrical potential difference 14V among electrodes 5 and 6, and measured the component current If and the emission current Ie which flow then. With Component A, the about 10mA component current If flowed immediately after measurement initiation, it decreased gradually, and the emission current Ie was observed in connection with it. On the other hand with Component B, the stable component current If and the emission current Ie were observed from the early stages of measurement, in component electrical-potential-difference 14V, the component current If was set to 2.0mA, the emission current Ie was set to 1.0microA, and electron emission effectiveness eta=Ie/If x100(%) was 0.05%. As mentioned above, although Component A has the remarkably large component current If and it is unstable in the early stages of measurement, on the other hand with Component B, it turns out that it is an electron emission component more stable than the early stages of measurement with the sufficient effectiveness eta.
[0115] Moreover, when the component current If and the emission current Ie were measured having returned to the 5th power of minus of the degree of vacuum 1.5x10 of activation, and carrying out the ** mark of the electrical potential difference to a component by the about 0.005Hz triangular wave about Component B, the property of the broken line shown in drawing 7 was shown. Like, till around about 5v, after [whose component current If carried out the increment in monotone] being shown in drawing 7 , it shows voltage-controlled negative resistance more than by 5V. At this time, the electrical potential difference (referred to as VP) the component current If indicates max to be is 5V. Moreover, the component current If was several [1/] of about 1mA of the greatest component current more than in 10V. The gestalt of the components A and B observed with the electron microscope is the same as that of what was shown in (a) of drawing 6 , and (b). (B) of drawing 6 shows that many coats (deposit) 61 are formed for a part of affected zone [three] of the component inter-electrode thin film (conductive film) 4 with Component A. On the other hand, with Component B, the coat (deposit) 61 was mainly especially formed for a part of affected zone [three] from (a) of drawing 6 depending on the impression direction of the electrical potential difference to the component at the time of activation in the conductive film 4 top by the side of the high potential electrode 5. It seemed that furthermore, this coat was formed also between the perimeter of a metal particle, and the particle if it observes by FESEM (the abbreviation for a secondary electron microscope) of a high scale factor.
[0116] In addition, when observed by TEM (transmission electron microscope) Raman etc., graphite and the carbon coat which consists of amorphous carbon were observed.
[0117] Moreover, since it activated below on the electrical potential difference **** which shows the voltage-controlled negative resistance described previously with Component A by these observation, Much carbon is formed in a part of affected zone of the thin film generated by foaming processing from Component B, and a remarkable big component current flows. On a measurement electrical potential difference The carbon coat formed between the high potential side of a thin film affected zone and the low voltage side serves as current pass, a several times as many component current as Component B flows, and it is thought that the component current was changed from the early stages of a drive.
[0118] On the other hand, with the component B which performed high resistance activation, since it activated above the electrical potential difference **** which shows the voltage-controlled negative resistance described previously, though a carbon coat is formed in a part of affected zone at the component A said appearance, it is thought that there are many parts where the carbon coat was partially cut from Component A electrically. For this reason, it is thought that it became the current stabilized from the early stages of a drive.
[0119] As mentioned above, the component current If and the emission current Ie were stabilized, and efficient electron emission was created by high resistance activation.
[0120] (Example 2) This example is an example of the image formation equipment which carried out passive-matrix arrangement of many surface conduction form electron emission components.
[0121] Some top views of an electron source are shown in drawing 13 . Moreover, the A-A' sectional view in drawing is shown in drawing 14 . However, what showed the same notation by drawing 13 , drawing 14 , drawing 15 , and drawing 16 shows the same thing. As for a component electrode and 141, the direction wiring of X corresponding to Dxm of drawing 8 in 82 corresponding to a substrate in 1 (it is also called bottom wiring), the direction wiring (it is also called upper wiring) of Y corresponding to Dyn of drawing 8 in 83, the thin film with which 4 contains the electron emission section, and 5 and 6 are [a layer insulation layer and 142] the contact holes for the component electrode 5, the bottom wiring 82, and electrical installation here.
[0122] Next, drawing 15 and drawing 16 explain the manufacture approach concretely according to the order of a

process.
[0123] Process-a : on the substrate 1 which formed silicon oxide with a thickness of 0.5 microns by the spatter on the defecated blue plate glass After carrying out the laminating of Cr with a thickness of 50A and the Au with a thickness of 6000A one by one with vacuum deposition, After BEKU [it / with a spinner / rotation-applying a photoresist (AZ1370 Hoechst A.G. make) and], a photo mask image is exposed and developed. The resist pattern of the bottom wiring 82 is formed, wet etching of the Au/Cr deposition film is carried out, and the wiring 82 under a desired configuration is formed ((a) of drawing 15).
[0124] The layer insulation layer 141 which consists of process-b:, next silicon oxide with a thickness of 1.0 microns is deposited by RF spatter ((b) of drawing 15).
[0125] Process-c: Make the photoresist pattern for forming a contact hole 142 in the silicon oxide deposited at said process b, etch the layer insulation layer 141 by making this into a mask, and form a contact hole 142. RIE (Reactive Ion Etching) for which etching used CF4 andH2 gas -- it was based on law ((c) of drawing 15).
[0126] Process-d: After that, the pattern which should serve as the component electrode 5 and the component inter-electrode gap G was formed by the photoresist (RD-2000N-41 Hitachi Chemical Co., Ltd. make), and the sequential deposition of Ti with a thickness of 50A and the nickel with a thickness of 1000A was carried out with the vacuum deposition method. The photoresist pattern was dissolved by the organic solvent, lift off of the nickel/Ti deposition film was carried out, and the component electrode spacing G made 300 microns width of face W1 of 3 microns and a component electrode, and formed the component electrodes 5 and 6 ((d) of drawing 15).
[0127] Process-e: After forming the photoresist pattern of the upper wiring 83 on the component electrodes 5 and 6, Ti with a thickness of 50A and Au with a thickness of 5000A were deposited with vacuum deposition one by one, lift off removed the unnecessary part, and the upper wiring 84 of a desired configuration was formed ((e) of drawing 16).
[0128] Process-f: The Cr film 151 of 1000A of thickness was carried out deposition and patterning with vacuum deposition, and heating baking processing for 10 minutes was carried out for organic [Pd] (ccp4230 Okuno Pharmaceuticals company make) at rotation spreading and 300 degrees C with the spinner on it. Moreover, the thickness of the thin film 2 for electron emission section formation which consists of a particle which consists of Pd as a main element formed in this way was 85A, and sheet resistance was 4th power omega /** of 3.9x10. In addition, as the particle film described here was mentioned above, it is the film with which two or more particles gathered, not only the condition that the particle distributed separately but a particle puts mutually contiguity or the film in the condition (the shape of an island is also included) of having overlapped, as the fine structure, and the particle size means the path about the particle which can recognize particle shape in said condition ((f) of drawing 16).
[0129] The process-g:Cr film 151 and the thin film 2 for electron emission section formation after baking were etched by acid etchant, and the desired pattern was formed ((g) of drawing 16).
[0130] Process-h: A pattern which applies a resist in addition to contact hole 142 part was formed, and the sequential deposition of Ti with a thickness of 50A and the Au with a thickness of 5000A was carried out with vacuum deposition. The contact hole 142 was embedded by removing an unnecessary part by lift off ((h) of drawing 16).
[0131] The bottom wiring 82, the layer insulation layer 141, the upper wiring 83, the component wiring 5 and 6, and the thin film 2 grade for electron emission section formation were formed on the insulating substrate 1 according to the above process.
[0132] Next, the example which constituted the electron source and the display is explained using drawing 9 and drawing 10 using the electron source substrate created as mentioned above.
[0133] After fixing the substrate 1 which produced the component as mentioned above on the rear plate 91, To 5mm upper part of a substrate 1, a face plate 96 (a fluorescent screen 94 and the metal back 95 are formed and constituted by the inside of a glass substrate 93) is arranged through a housing 92. Frit glass was applied to the joint of a face plate 96, a housing 92, and the rear plate 91, and it sealed by calcinating 10 minutes or more at 400 degrees C thru/or 500 degrees C in atmospheric air or nitrogen-gas-atmosphere mind. Moreover, frit glass also performed immobilization of the substrate 1 to the rear plate 91.
[0134] In this example, 84 of drawing 9 is an electron emission component before electron emission section formation (for example, it is equivalent to (b) of drawing 2), and 82 and 83 are component wiring of the direction of X, and the direction of Y, respectively.
[0135] In the case of monochrome, it consisted only of the fluorescent substance, but in this example, the fluorescent substance adopted the stripe configuration ((a) of drawing 10), and the fluorescent screen 94 formed the black stripe previously, applied each color fluorescent substance to the gap section, and produced the fluorescent screen 94. The ingredient which uses as a principal component the graphite used well was usually used as an ingredient of a black stripe. The approach of applying a fluorescent substance to a glass substrate 93 used slurry method.
[0136] Moreover, the metal back 95 is usually formed in the inside side of a fluorescent screen 94. The metal back performed data smoothing (usually called filming) of the inside side front face of a fluorescent screen after fluorescent

screen production, and it produced by carrying out vacuum deposition of A1 after that.
[0137] In order to raise the conductivity of a fluorescent screen 94 to a face plate 96 further, the transparent electrode (un-illustrating) prepared in the external surface side of a fluorescent screen 94, and there was also a **** case in it, but in this example, since conductivity sufficient in just the metal back was acquired, it omitted.
[0138] When performing the above-mentioned sealing, in the case of the color, sufficient alignment was performed in order to have to make each color fluorescent substance and an electron emission component correspond.
[0139] After exhausting the ambient atmosphere in the glassware completed as mentioned above with the vacuum pump through the exhaust pipe (not shown) and reaching sufficient degree of vacuum, the electrical potential difference was impressed between the electrode 5 of the electron emission component 74, and 6 through the container outer edge child Dxo1 thru/or Doxm, Doy1, or Doyn, and foaming processing of the thin film 2 for electron emission section formation was carried out. The voltage waveform of foaming processing is the same as that of (b) of drawing 4 .
[0140] In this example, T1 was made into 1 ms, T2 was made into 10 mses, and it carried out under the vacuum ambient atmosphere of the 5th power of the minus torr of about 1x10.
[0141] Thus, the created electron emission section 3 changed into the condition that the particle which uses a palladium element as a principal component was distributed, and the mean particle diameter of the particle was 30A.
[0142] Next, by the same square wave as foaming, high resistance activation was performed wave height 14V with the degree of vacuum of the 5th power of the minus torr of a degree of vacuum 2x10, measuring the component current If and the emission current Ie.
[0143] Foaming and activation were performed, the electron emission section 3 was formed, and the electron emission component 84 was produced.
[0144] Next, it exhausted to the about [a minus 6 power torr] degree of vacuum of 10, and welded by heating a non-illustrated exhaust pipe with a gas burner, and the closure of an envelope was performed.
[0145] In order to maintain the degree of vacuum after the closure finally, getter processing was performed by the high-frequency-heating method.
[0146] In the image display device of this invention completed as mentioned above for each electron emission component Through the container outer edge child Dx1 Dxm and Dy1 thru/or Dyn by impressing a scan signal and a modulating signal from a signal generation means by which it does not illustrate, respectively Carried out electron emission, and impressed the high pressure of 5kV or more to the metal back 95 through the secondary terminal Hv, accelerated the electron beam, it was made to collide with a fluorescent screen 99, and the image was displayed by making light excite and emit. Moreover, both sides showed the continuous line of drawing 7 , and the component current If and the emission current Ie were stable from the early stages of a drive. Moreover, it was the emission current which can respond also to brightness 100fL-150fL required of television at this time.
[0147] (Example 3) Drawing 17 is drawing to show an example of the display constituted so that the image information with which the display panel which used the surface conduction form electron emission component of said explanation as an electron source is provided from the various sources of image information including television broadcasting could be displayed. A display panel and 17101 17100 among drawing 17 The drive circuit of a display panel, A display controller and 17103 17102 Gore PUREKUSA, A decoder and 17105 17104 An input/output interface circuit, 17106 an image generation circuit, 17108, and 17109 and 17110 for CPU and 17107 An image memory interface circuitry, As for an image input interface circuitry, and 17112 and 17113, 17111 is [TV signal receive circuit and 17114] the input sections (in addition, this display). For example, although voice is naturally reproduced to a display and coincidence of an image when receiving the signal which contains both image information and speech information like a television signal explanation is omitted about a circuit, a loudspeaker, etc. about reception, separation, playback, storage, etc. of the speech information which is not directly related to the description of this invention. .
[0148] Hereafter, the function of each part is explained in accordance with the flow of a picture signal.
[0149] First, the TV signal receive circuit 17113 is a circuit for receiving TV picture signal transmitted using radio-transmission systems, such as an electric wave and space optical communication. Especially the method of TV signal to receive may be restricted and many methods, such as not a thing but NTSC system, a PAL system, and an SECAM system, are sufficient as it. Moreover, TV signal (for example, the so-called high definition TV including MUSE) which consists of these from much scanning lines further is a suitable source of a signal to employ the advantage of said display panel suitable for large-area-izing or large pixel number-ization efficiently. TV signal received by the TV signal receive circuit 17113 is outputted to a decoder 17104.
[0150] Moreover, the TV signal receive circuit 17112 is a circuit for receiving TV picture signal transmitted using cable-transmission systems, such as a coaxial cable and an optical fiber. Like said TV signal receive circuit 17113, especially the method of TV signal to receive is not restricted and TV signal received in this circuit is also outputted to a decoder 17104.
[0151] Moreover, the picture signal which the image input interface circuitry 17111 is a circuit for incorporating the

picture signal supplied from picture input devices, such as a TV camera and an image reading scanner, and was incorporated is outputted to a decoder 17104.
[0152] Moreover, the picture signal which the image memory interface circuitry 17110 is a circuit for incorporating the picture signal memorized by the video tape recorder (it omits Following VTR), and was incorporated is outputted to a decoder 17104.
[0153] Moreover, the picture signal which the image memory interface circuitry 17109 is a circuit for incorporating the picture signal memorized by the videodisk, and was incorporated is outputted to a decoder 17104.
[0154] Moreover, the static-image data which are a circuit for incorporating a picture signal and were incorporated are inputted into a decoder 17104 from the equipment with which the image memory interface circuitry 17108 has memorized static-image data like the so-called still picture disk. Moreover, the input/output interface circuit 17105 is a circuit for connecting this display and output units, such as an external computer, a computer network, or a printer. Not to mention performing I/O of image data, or an alphabetic character and graphic form information, it is also possible to perform a control signal, I/O of numeric data, etc. between CPUs17106 and the exteriors with which this indicating equipment is equipped depending on the case.
[0155] moreover, the image data, and an alphabetic character and graphic form information that the image generation circuit 17107 is inputted from the outside through said input/output interface circuit 17105 -- or it is a circuit for generating the image data for a display based on the image data, and the alphabetic character and graphic form information which are outputted from CPU17106. The circuit required for generation including images, such as rewritable memory for accumulating image data, and an alphabetic character and graphic form information, read-only memory the image pattern corresponding to a character code is remembered to be, and a processor for performing an image processing, is included in the interior of this circuit.
[0156] Although the image data for a display generated by this circuit is outputted to a decoder 17104, it is also possible to output to an external computer network and an external printer through said input/output interface circuit 17105 depending on the case.
[0157] Moreover, CPU17106 mainly does the activity in connection with the motion control of this display, generation of a display image, selection, or edit.
[0158] For example, a control signal is outputted to a multiplexer 17103, and the picture signal displayed on a display panel is chosen suitably, or is combined. moreover, the picture signal displayed in that case -- responding -- the display-panel controller 17102 -- receiving -- a control signal -- generating -- a screen-display frequency, a scan method (for example, is it an interlace or non-interlaced?), and a stroke -- actuation of displays, such as the number of the scanning lines of a field, is controlled suitably.
[0159] Moreover, the direct output of image data, or an alphabetic character and graphic form information is carried out, or an external computer and memory are accessed through said input/output interface circuit 17105 to said image generation circuit 17107, and image data, and an alphabetic character and graphic form information are inputted. In addition, of course, CPU17106 may be concerned also with the activity of the purposes other than this. For example, it may be directly concerned with the function which generates information or is processed like a personal computer or a word processor. Or as mentioned above, it may connect with an external computer network through the input/output interface circuit 17105, for example, the activity of numerical calculation etc. may be done in cooperation with an external instrument.
[0160] Moreover, the input section 17114 is for a user to input an instruction, a program or data, etc. into said CPU17106, for example, can use various input devices, such as a keyboard, a joy stick besides a mouse, a bar code reader, and a voice recognition unit.
[0161] Moreover, a decoder 17104 is a circuit for carrying out inverse transformation of the various picture signals inputted from said 17107 thru/or 17113 to a three-primary-colors signal or a luminance signal and an I signal, and a Q signal. In addition, all over this drawing, as a dotted line shows, as for a decoder 17104, it is desirable to equip the interior with an image memory. This is for treating TV signals which face carrying out inverse transformation and need an image memory including MUSE.
[0162] Moreover, it is because the advantage that image processings and edits including infanticide of an image, interpolation, expansion, contraction, and composition can be easily performed now in cooperation with said image generation circuit 17107 and CPU17106 is born or the display of a still picture becomes easy by having an image memory.
[0163] Moreover, a multiplexer 17103 chooses a display image suitably based on the control signal inputted from said CPU17106. Namely, a multiplexer 17103 chooses [from] a desired picture signal among the picture signals which are inputted from a decoder 17104 and by which inverse transformation was carried out, and outputs it to the drive circuit 17101. In that case, it is also possible by changing and choosing a picture signal within 1 screen-display time amount to display the image which divides one screen into two or more fields, and changes with fields like the so-called multi-

screen television.
[0164] Moreover, the display-panel controller 17102 is a circuit for controlling actuation of the drive circuit 17101 based on the control signal inputted from said CPU17106.
[0165] First, as a thing in connection with fundamental actuation of a display panel, the signal for controlling the operating sequence of the power source for a drive of a display panel (not shown), for example is outputted to the drive circuit 17101. Moreover, the signal for controlling for example, a screen-display frequency and a scan method (for example, is it an interlace or non-interlaced?) is outputted to the drive circuit 17101 as a thing in connection with the drive approach of a display panel.
[0166] Moreover, depending on the case, the control signal in connection with adjustment of the brightness and contrast of a display image, a color tone, or the image quality of sharpness may be outputted to the drive circuit 17101.
[0167] Moreover, the drive circuit 17101 is a circuit for generating the driving signal impressed to a display panel 17100, and operates based on the picture signal inputted from said multiplexer 17103, and the control signal inputted from said display-panel controller 17102.
[0168] As mentioned above, although the function of each part was explained, it is possible to display the image information inputted from the various sources of image information in this indicating equipment by the configuration illustrated to drawing 17 on a display panel 17100. That is, after inverse transformation of various kinds of picture signals including television broadcasting is carried out in a decoder 17104, they are suitably chosen in a multiplexer 17103 and are inputted into the drive circuit 17101. On the other hand, a display controller 17102 generates the control signal for controlling actuation of the drive circuit 17101 according to the picture signal to display. The drive circuit 17101 impresses a driving signal to a display panel 17100 based on the above-mentioned picture signal and a control signal. Thereby, an image is displayed in a display panel 17100. These the actuation of a series of is controlled by CPU17106 in generalization.
[0169] Moreover, in this indicating equipment, it is possible in it not only displaying the image memory built in said decoder 17104, and the thing chosen from the image generation circuit 17107 and information, but carrying out edits including an image, such as composition including image processings, such as expansion, contraction, rotation, migration, edge enhancement, infanticide, interpolation, color conversion, and aspect ratio conversion of an image, elimination, connection, exchange, and fitting, as opposed to the image information to display. Moreover, although especially explanation of this example did not describe, the specialized circuit for performing processing and edit also about speech information may be prepared like the above-mentioned image processing or image edit.
[0170] Therefore, this indicating equipment can have functions, such as terminal equipments for office work including the image edit device treating the display device of television broadcasting, the terminal equipment of a television conference, a static image, and a dynamic image, the terminal equipment of a computer, and a word processor, and a game machine, by one set, and its application range is very wide as industrial use or a noncommercial use.
[0171] In addition, it cannot be overemphasized that it is not what does not pass over above-mentioned drawing 17 for an example of the configuration of the display using the display panel which makes a display conduction type emission component the source of an electron beam to have been shown, but is limited only to this. For example, even if it excludes the circuit in connection with the function which does not have the purpose-of-use top need among the components of drawing 17 , it does not interfere. Moreover, contrary to this, a component may be further added depending on the purpose of use. For example, when applying this indicating equipment as a TV phone machine, it is suitable to add the transceiver circuit containing a television camera, a voice microphone, a lighting machine, and a modem etc. to a component.
[0172] In this indicating equipment, since the formation of a thin form of the display panel which especially makes a surface conduction form electron emission component the source of an electron beam is easy, depth of an indicating equipment can be made small. Big-screen-izing is easy for the display panel which makes a surface conduction form electron emission component the source of an electron beam in addition to it, and since brightness is highly excellent also in an angle-of-visibility property, this display can display the image which was rich in overflow force with sufficient visibility on presence.
[0173] (Example 4) This examples are many surface conduction mold electron emission components and an example of the image formation equipment which has a control electrode (grid).
[0174] Since the manufacture approach of the image formation equipment of this example was produced by the approach almost equivalent to an example 2, it carries out the detail of the explanation.
[0175] First, the example of the electron source which prepared many surface conduction form electron emission components on the substrate, and the display adapting this is explained. Drawing 19 and drawing 20 are the mimetic diagrams for explaining on a substrate two examples of the electron source which carried out array formation of many of a surface conduction form electron emission component.
[0176] First, an insulating substrate with S made [with a substrate] from glass in drawing 19 , the surface conduction

form electron emission component with which ES enclosed with a dotted line was prepared on said substrate S, and E1-E10 express the wiring electrode for wiring said surface conduction form electron emission component. On the substrate, along the direction of X, a surface conduction form electron emission component makes a train, and is formed (this is hereafter called an element array). Common wiring of the surface conduction form electron emission component which constitutes each element array is electrically carried out at juxtaposition with the wiring electrode of the both sides which sandwich this (for example, the 1st train is wired with the wiring electrodes E1 and E2 of both sides).

[0177] The electron source of this example can drive each element array independently by impressing proper driver voltage to wiring inter-electrode. Namely, what is necessary is just to impress the suitable electrical potential difference (for example, 0 [V]) which does not exceed an electron emission threshold to the element array which does not emit an electron beam for the suitable electrical potential difference exceeding an electron emission threshold to an element array to make it emit an electron beam again (explanation of still the following describes VE [V] the suitable driver voltage exceeding an electron emission threshold.).

[0178] Next, it is other examples of an electron source which are shown in drawing 20 , and an insulating substrate with S made [with a substrate] from glass, the surface conduction form electron emission component with which ES enclosed with a dotted line was prepared on said substrate S, and E'1 to E'6 express the wiring electrode for carrying out common wiring of said surface conduction form electron emission component. Like the example of said drawing 19 , also in this example, a surface conduction form electron emission component makes a train, and is formed along the direction of X, and common wiring of the surface conduction form electron emission component of each element array is electrically carried out with the wiring electrode at juxtaposition. Furthermore, one wiring electrode is performing near common wiring with which the element array which adjoins in this example adjoins as the wiring electrode E'2 serves as common wiring of one side of the 1st train of an element array, and the 2nd train, for example. The electron source of this example has the advantage that array spacing arranged in the direction of Y can be made small, when the surface conduction form electron emission component and wiring electrode of the same configuration are used as compared with the train of said drawing 19 .

[0179] The electron source of this example can drive each element array independently by impressing proper driver voltage to wiring inter-electrode. Namely, the electron emission element array which carries out electron emission should just impress the electrical potential difference of 0 [V] to the element array to which electron emission of VE [V] is not carried out. For example, the potential of 0 [V] is impressed to each wiring electrode of E'1 to E'3 and the potential of VE [V] is impressed to each wiring electrode of E'4 to E'6 to drive only the 3rd train. consequently -- although the electrical potential difference of VE-0=VE [V] is impressed to the element array of the 3rd train -- other element arrays -- receiving -- 0- 0= 0 [V] -- or VE-VE= -- 0 [V] -- as -- the electrical potential difference of 0 [V] will be impressed -- it divides and comes out. Moreover, what is necessary is to impress the potential of 0 [V] to the wiring electrode E'1, E'2, and E'6, and just to impress the potential of VE [V] to the wiring electrode E'3, E'4, and E'5, in making coincidence drive the 2nd train and the 5th train for example. Thus, it is possible to drive the element array of arbitration alternatively also in this example.

[0180] In addition, in the electron source of above-mentioned drawing 19 and drawing 20 , although the surface conduction form electron emission component was able to be stood in a line in the direction of X in 12 per train from on [of illustration] expedient, an element number may not be restricted to this and may arrange a large number more. Moreover, although the element array of five trains was put in order in the direction of Y, the number of element arrays may not be restricted to this, and may arrange a large number more.

[0181] Next, an example is given and explained about the monotonous mold CRT using the above-mentioned electron source.

[0182] Drawing 21 is drawing to show the panel structure of the monotonous mold CRT equipped with the electron source of said drawing 17 , the inside VC of drawing is a glass vacuum housing, and FP which is the part shows the face plate by the side of the screen. A transparent electrode made from ITO is formed in the inside of a face plate FP, and the fluorescent substance of red, green, and blue is further distinguished by different color with a mosaic or in the shape of a stripe on this transparent electrode. In order to avoid complication of a drawing, all over drawing, a fluorescent substance is aligned with a transparent electrode and it is shown as a PH. In addition, it is also possible to prepare the black matrix well-known in a field or black stripe of CRT between the fluorescent substances of each color, and to form the well-known metal back layer same on a fluorescent substance. Said transparent electrode is electrically connected the outside of a vacuum housing through Terminal EV so that the acceleration voltage of an electron beam can be impressed.

[0183] Moreover, S is the substrate of the electron source fixed to the base of a vacuum housing VC, and as said drawing 19 explained, array formation of the surface conduction form electron emission component is carried out. In addition, the element array with which 200 per train were wired by juxtaposition in this example is 200 successive-

installation eclipse ******. It has connected by turns [the electrode terminals Dp1-Dp200 and Dm1-Dm200, and by turns] which were prepared in the panel side face of both sides, and two wiring electrodes of each element array can impress a drive electrical signal now from the outside of a vacuum housing.
[0184] Moreover, the stripe-like grid electrode GR is formed in the middle of Substrate S and a face plate FP. said element array and the grid electrode GR cross at right angles, and the opening Gh to prepare independently 200 (namely, the direction of Y -- meeting), and make each grid electrode passing an electron beam is formed. Opening Gh may prepare much passage openings in the shape of a mesh depending on the case, although the thing circular one piece at a time is prepared corresponding to each surface conduction form electron emission component. Each grid electrode is electrically connected by the electronic terminals G1-G200 the outside of a vacuum housing. In addition, as long as a grid electrode can modulate the electron beam emitted from the surface conduction form electron emission component, they may be prepared [whose configuration or installation location of the are not] necessarily like drawing 21 a perimeter and near the surface conduction form electron emission component.
[0185] The element array and grid electrode of a surface conduction form electron emission component constitute XY matrix of 200x200 from this display panel. Therefore, by impressing the modulating signal for the image of one line to a grid electrode train at coincidence synchronizing with carrying out the sequential drive (scan) of the one every train of the element arrays, the exposure to the fluorescent substance of each electron beam is controlled, and it displays the image of one line at a time.
[0186] Next drawing 22 is what showed the electrical circuit for driving the display panel of said drawing 21 as a block diagram, and, for SHIRI / Para conversion circuit, and 1003, as for a modulating-signal generating circuit and 1005, the Rhine memory and 1004 are [a decoding circuit for 1000 in drawing 22 to decode the display panel of said drawing 21 , and the composite picture signal which inputs 1001 from the outside, and 1002 / a timing control circuit and 1006] scan signal generating circuits. The electrode terminal of a display panel 1000 is respectively connected with the electrical circuit, and the scan signal generating circuit 1006 and terminals Dm1-Dm200 are connected [the voltage source HV and terminals G1-G200 with which Terminal EV generates the acceleration voltage of 10 [kV]] with the gland for the modulating-signal generating circuit 1004 and terminals Dp1-Dp200.
[0187] Hereafter, the function of each part is explained. First, the decoding circuit 1001 is a circuit for [which is inputted from the outside] decoding composite picture signals, such as an NTSC TV signal, for example, a luminance-signal component and a synchronizing signal component are separated from a composite picture signal, and by making the former into a Data signal, makes the latter a Tsync signal and outputs it to SHIRI / Para conversion circuit 1002 in the timing control circuit 1005. That is, the decoding circuit 1001 arranges the brightness for every color component of RGB according to the color pixel array of a display panel 1000, and carries out a sequential output at SHIRI / Para conversion circuit 1002. Moreover, a Vertical Synchronizing signal and a Horizontal Synchronizing signal are extracted, and it outputs to the timing control circuit 1005. The timing control circuit 1005 generates the various timing control signals for adjusting the timing of each part of operation on the basis of said synchronizing signal Tsync. That is, to SHIRI / Para conversion circuit 1002, Tscan is outputted [Tsp / Tmry] for Tmod to the scan signal generating circuit 1006 to the modulating-signal generating circuit 1004 to the Rhine memory 1003.
[0188] the timing signal Tsp into which the luminance signal Data which inputs SHIRI / Para conversion circuit 1002 from the decoding circuit 1001 is inputted from the timing control circuit 1005 -- being based -- a sequential sampling -- carrying out -- 200 parallel signals I1 - I200 ****** -- it outputs to the Rhine memory 1003. When SHIRI / Para conversion of the data for one line of an image are carried out, the timing control circuit 1005 is written in to the Rhine memory 1003, and outputs the timing control signal Tmry. the Rhine memory 1003 receives Tmry -- I1 - the contents of I200 -- memorizing -- it -- I'1 - although it is referred to as I'200 and outputted to the modulating-signal generating circuit 1004, this is held until the following write-in timing control signal Tmry is inputted into the Rhine memory.
[0189] the timing control signal Tmod which the modulating-signal generating circuit 1004 is a circuit for generating the modulating signal impressed to the grid electrode of a display panel 1000 based on the brightness data for the image of one line inputted from the Rhine memory 1003, and the timing control circuit 1005 generates -- doubling -- modulating-signal terminal G1 - it is impressed by G200 at coincidence. Although a modulating signal uses the electrical-potential-difference modulation technique which changes the magnitude of an electrical potential difference according to the brightness data of an image, it is also possible to use the pulse width modulation which changes the die length of an electrical-potential-difference pulse according to brightness data.
[0190] Moreover, the scan signal generating circuit 1006 is a circuit for generating the electrical-potential-difference pulse for driving suitably the element array of the surface conduction form electron emission component of a display panel 1000. According to the timing control signal Tscan which the timing control circuit 1005 generates, an internal switching circuit is changed suitably, the suitable driver voltage VE [V] or the grand level (namely, 0 [V]) exceeding the threshold of the surface conduction form electron emission component which the source DV of a constant voltage generates is chosen, and it is impressed by terminals Dp1-Dp200.

[0191] A driving signal is impressed to a display panel 1000 by the above circuit to the timing shown in the timing diagram of drawing 23 . For (a) - in drawing 23 (d), although a part of signal impressed to the terminals Dp1-Dp200 of a display panel from the scan signal generating circuit 1006 is shown, as shown in drawing, the electrical-potential-difference pulse of the amplitude VE [V] is Dp1, Dp2, and Dp3 one by one for every one-line display time of an image. -- It is impressed in order. On the other hand, since terminals Dm1-Dm200 are always connected with the grand level (0 [V]), the sequential drive of the element array is carried out by the above-mentioned electrical-potential-difference pulse from eye the 1st train, and the electron beam is outputted.
[0192] Moreover, the modulating signal for one line of an image is impressed to terminals G1-G200 at coincidence to the timing shown in this drawing (f) by the dotted line from the modulating-signal generating circuit 1004 synchronizing with this. Synchronizing with a scan signal being changed, a modulating signal is also changed one by one, and the image for one screen is displayed. By performing this repeatedly continuously, it is the reason which can display a television animation.
[0193] In the above, although the monotonous mold CRT equipped with the electron source of drawing 19 was explained, the monotonous mold CRT equipped with the electron source of said drawing 20 next is explained using drawing 22 .
[0194] Fundamentally, the monotonous mold CRT of drawing 24 replaces the electron source section of the monotonous mold CRT of said drawing 21 by the type of drawing 20 , and constitutes XY matrix of 200x200 from an electron emission element array and a grid electrode. However, since wiring of the surface conduction form electron emission component of 200 trains is made with 201 wiring electrodes of E1-E201, 201 electrode terminals of Ex1-Ex201 are prepared in the vacuum housing.
[0195] Although the drive circuit which drives this display panel 1008 to drawing 25 is shown, if the scan signal generating circuit 1007 is removed, it is fundamentally [as the circuit of said G4 Fig.] the same. Although the scan signal generating circuit 1007 chooses suitably the suitable driver voltage VE [V] or the grand level (0 [V]) exceeding the electron emission threshold of the surface conduction form electron emission component which the source DV of a constant voltage generates and outputs it to the terminal of a display panel, it shows the timing to the timing diagram of drawing 24 . Although a display panel performs a display action to the timing shown in (a) therefore, a driving signal as shown in (b) - (e) from the scan signal generating circuit 1007 is impressed to electrode terminals Ex1-Ex4. Therefore, an electrical potential difference like (f) - (h) is impressed to a surface conduction form electron emission element array, and a sequential drive is carried out at a time by one train. Synchronizing with this, from the modulating-signal generating circuit 1004, a modulating signal is outputted to timing like (i), and an image is displayed one by one.
[0196] It was that to which the image formation equipment of this example also does so the same effectiveness as an example 2.
[0197]
[Effect of the Invention] Since the coat which uses as a principal component the carbon which was explained above, and which becomes a part of electron emission section from graphite, amorphous carbon, or those mixture was controlled and covered with the activation process of an electron emission component like according to this invention, it became controllable [the unknown electron emission characteristic] in the vacuum conventionally.
[0198] This activation process is considering as the process which covers the coat which uses carbon as a principal component to this thin film, and the process which impresses the electrical potential difference more than a voltage-controlled negative-resistance-characteristics field to the electrode of the pair of this electron emission component in a vacuum more preferably. From this a part of electron emission section, the property was more stable than the drive early stages of an electron emission component by covering carbon with the coat used as a principal component to a high potential side, and the component current was small and the creation of an electron emission component with high effectiveness of it was attained.
[0199] Furthermore, in the electron source which emits an electron according to an input signal, it can create now with sufficient yield stably. Moreover, there is little power consumption, it was mitigated by improvement in effectiveness and the burden of a circumference circuit etc. has also offered cheap equipment by it.
[0200] Moreover, in image formation equipment, bright high-definition image formation equipment, for example, color flat television, was realized by low current in the image formation equipment which it is stable, and improvement in the electron emission characteristic and effectiveness which were controlled is made, for example, uses a fluorescent substance as an image formation member.

[Translation done.]

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention is concerned with image formation equipments, such as a display which are an electron source and its application, and relates to image formation equipments, such as a new surface conduction mold electron emission component of a configuration, an electron source using it, and a display that is the application, especially.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Conventionally, two kinds, the source of a thermoelectron and a cold cathode electron source, are known as an electron emission component. There are an electron emission mold (it abbreviates to FE mold below), a metal / insulating layer / metal mold (it abbreviates to an MIM mold below), a surface conduction mold electron emission component, etc. in a cold cathode electron.

[0003] As an example of FE mold, they are W.P.Dyke&W.W.Dolan, "Fieldemission", and Advance. in Electron Physics, 8 and 89 (1956) or C.A.Spindt, "PHYSICALProperties of thin-filmfield emission cathodes with molybdenium cones", J.Appl.Phys., 47, 5248 (1976), etc. are known.

[0004] As an example of an MIM mold, they are C.A.Mead and "The. tunnel-emission amplifier, J.Appl.Phys., 32,646 (1961), etc. are known.

[0005] As an example of a surface conduction mold electron emission component, they are M.I.Elinson and RadioEng.Electron. There are Pys., 10, etc. (1965).

[0006] A surface conduction mold electron emission component uses the phenomenon which electron emission produces for the thin film of the small area formed on the substrate by passing a current in parallel to a film surface. As this surface conduction mold electron emission component, it is SnO2 by said Elinson etc. The thing using a thin film, Thing [G. depended on Au thin film Dittmer: "Thin Solid Films", 9,317(1972)], and In2 03 / SnO2 Thing [M. depended on a thin film Hartwe11 and C.G.Fonstad: "IEEE Trans.ED Conf.", What is depended on 519(1975)] and a carbon thin film [an Araki ****:vacuum, the 26th volume, No. 1, and 22 pages (1983)] is reported.

[0007] Above-mentioned M. Hartwell's component configuration is shown in drawing 18 as a typical component configuration of these surface conduction mold electron emission components. In this drawing, 1 is an insulating substrate. 2 is a thin film for electron emission section formation, it consists of a metallic-oxide thin film formed in the pattern of H mold configuration by the spatter, and the electron emission section 3 is formed of the energization processing called the below-mentioned foaming. 4 will call it the thin film containing the electron emission section. In addition, L1 in drawing is set up by 0.5-1mm, and W is set up by 0.1mm.

[0008] Conventionally, before performing electron emission in these surface conduction mold electron emission components, it was common to have formed the electron emission section 3 by energization processing beforehand called foaming in the thin film 2 for electron emission section formation. that is, with foaming, impression passage of the minute is carried out in direct current voltage or about ****** /, for example, 1v, carried out very slowly to the both ends of said thin film 2 for electron emission section formation, and the thin film for electron emission formation is destroyed, deformed or deteriorated locally -- making -- electric -- high -- it is forming the electron emission section 3 changed into the condition [****]. In addition, a crack generates the electron emission section 3 in some thin films 2 for electron emission section formation, and electron emission is performed from near [the] a crack. The thin film 2 for electron emission section formation containing the electron emission section formed by foaming below is called the thin film 4 containing the electron emission section. The surface conduction mold electron emission component which carried out said foaming processing impresses an electrical potential difference to the thin film 4 containing the above-mentioned electron emission section, and makes an electron emit from the above-mentioned electron emission section 3 by passing a current for a component.

[0009] However, in the surface conduction mold electron emission component of these former, although there were various problems in utilization, these people etc. considered wholeheartedly various improvements which are mentioned later, and have solved various troubles on utilization.

[0010] An above-mentioned surface conduction mold electron emission component has the advantage to which structure can carry out array formation of the a large number component ranging from it being simple and manufacture being easy to a large area. Then, various application in which this description can be employed efficiently is studied. For example, the source of an electric charge beam, a display, etc. are raised.

[0011] As an example which carried out array formation of many surface conduction mold electron emission

components, a surface conduction mold electron emission component is arranged to juxtaposition, and the electron source which carried out the line array of many lines which connected the both ends of each component with wiring, respectively is raised. (For example, JP,64-31332,A, JP,1-283749,A, JP,1-257552,A) Especially, in image formation equipments, such as a display, there is a trouble of having to have a back light etc., since it is not a spontaneous light type, although the monotonous mold display using liquid crystal has replaced and spread through CRT in recent years, and development of a spontaneous light type display has been desired again. It is the spontaneous light type display which could manufacture comparatively easily the image formation equipment which is a display which combined the fluorescent substance which makes the light emit light also with the equipment of a big screen, and was excellent in display grace with the electron emitted from the electron source which has arranged many surface conduction mold electron emission components, and the electron source (for example, USP No. 5066883).

[0012] In addition, selection of the component to which electron emission is carried out and luminescence of a fluorescent substance is carried out from the electron source which consisted of many surface conduction mold electron emission components conventionally Wiring which arranges and connected many above-mentioned surface conduction mold electron emission components to juxtaposition (it is called line writing direction wiring), It is based on the suitable driving signal to the control electrode (it is called the grid) and the direction wiring of a train which were installed in the direction which intersects perpendicularly with line wiring in the space between (it is called the direction of a train), this electron source, and a fluorescence pair (for example, JP,1-283749,A etc.).

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] Since the coat which uses as a principal component the carbon which was explained above, and which becomes a part of electron emission section from graphite, amorphous carbon, or those mixture was controlled and covered with the activation process of an electron emission component like according to this invention, it became controllable [the unknown electron emission characteristic] in the vacuum conventionally.
[0198] This activation process is carbon to this thin film more preferably. By considering as the process which covers the coat used as a principal component, and the process which impresses the electrical potential difference more than a voltage-controlled negative-resistance-characteristics field to the electrode of the pair of this electron emission component in a vacuum, from a part of this electron-emission section, the property was more stable than the drive early stages of an electron emission component by covering carbon with the coat used as a principal component to a high potential side, and the component current was small and the creation of an electron emission component with high effectiveness of it was attained.
[0199] Furthermore, in the electron source which emits an electron according to an input signal, it can create now with sufficient yield stably. Moreover, there is little power consumption, it was mitigated by improvement in effectiveness and the burden of a circumference circuit etc. has also offered cheap equipment by it.
[0200] Moreover, in image formation equipment, bright high-definition image formation equipment, for example, color flat television, was realized by low current in the image formation equipment which it is stable, and improvement in the electron emission characteristic and effectiveness which were controlled is made, for example, uses a fluorescent substance as an image formation member.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the behavior in the vacuum of the surface conduction mold electron emission component used for said electron source, image formation equipment, etc. was hardly found, but improvement in the stable and controlled electron emission characteristic and its effectiveness has been desired.
[0014] Effectiveness puts a current ratio with the current (it is hereafter called the emission current Ie) emitted into the vacuum over the flowing current (it is hereafter called the component current If) here, when an electrical potential difference is impressed to the component electrode with which the pair of a surface conduction mold electron emission component counters.
[0015] That is, a component current is small as much as possible, and the large thing of the emission current as much as possible is desirable.
[0016] It is stable, and if improvement in the electron emission characteristic and effectiveness which were controlled is made, in the image formation equipment which uses a fluorescent substance as an image formation member, for example, bright high-definition image formation equipment, for example, flat television, will be realized by low current. Moreover, it is also expectable that the drive circuit which constitutes image formation equipment becomes cheap with low-current-izing. In view of the above-mentioned problem, this invention is stable and is controlled, and a component current offers the electron source and image formation equipment using a new configuration, its manufacture approach, and it of an electron emission component with the small high effectiveness in which the emission current is large as it may be made as it may be made.

[Translation done.]

MEANS

[Means for Solving the Problem] The electron emission component of this invention which solves the above-mentioned technical problem In the electron emission component which has the conductive film which contains the high resistance section in inter-electrode [which counters] The deposit which is the electron emission component characterized by having the deposit which uses carbon as a principal component, and uses said carbon as a principal component preferably at this high resistance section It is the electron emission component which exists on said conductive film from said a part of high resistance section, and the deposit which uses said carbon as a principal component is an electron emission component which is unevenly distributed from said a part of high resistance section on the conductive film by the side of the high potential electrode of said electrodes still more preferably.
[0018] Moreover, the manufacture approach of the above-mentioned electron emission component is set to the manufacture approach of an electron emission component of having the conductive film which contains the electron emission section in inter-electrode [which counters]. Said activation process which is the manufacture approach of the electron emission component by which it is characterized, and says having the activation process of a component here Having the process on which said component is made to deposit the deposit which uses carbon as a principal component, the above activation process has preferably the process which impresses an electrical potential difference to the conductive film prepared in inter-electrode in the vacuum.
[0019] Moreover, impression of this electrical potential difference is impression of a pulse-like electrical potential difference, and, as for this better **, it is good that it is the driver voltage of an electron emission component especially preferably.
[0020] This invention is an electron source which has the above electron emission component and emits an electron according to an input signal. Furthermore, preferably It is the electron source characterized by having arranged two or more above-mentioned electron emission components on a base. The line of the electron emission component which has arranged two or more two or more electron emission components to juxtaposition, and connected the both ends of each component to the base at wiring Two or more rice cake, the arrangement gestalt which has the modulation means further, Or it is the electron source which has mutually the arrangement gestalt which arranged two or more electron emission components which connected the component electrode of the pair of this electron emission component to the direction wiring of X of m and the direction wiring of Y of n which were insulated electrically in a base.
[0021] Furthermore, this invention is image formation equipment and is image formation equipment characterized by ** which has an image formation member and the electron source of said this invention at least in the image formation equipment which forms an image based on an input signal.
[0022] Below, the desirable embodiment of this invention is described.
[0023] First, the fundamental configuration of the surface conduction mold electron emission component concerning this invention is explained.
[0024] (a) of drawing 1 and (b) are the top views and sectional views showing the configuration of the surface conduction mold electron emission component of the fundamental flat-surface mold in connection with this invention, respectively. The fundamental configuration of the component concerning this invention is explained using drawing 1 .
[0025] The thin film (conductive film) with which a substrate, and 5 and 6 contain a component electrode and, as for 4, 1 contains the electron emission section in drawing 1 , and 3 are the electron emission sections.
[0026] It is SiO2 which formed impurity contents, such as quartz glass and Na, in the glass which decreased in number, blue plate glass, and blue plate glass by the spatter etc. as a substrate 1. Ceramics, such as aluminas, such as a glass substrate which carried out the laminating, etc. is mentioned.
[0027] Although you may be what kind of thing as long as it has conductivity as an ingredient of the component electrodes 5 and 6 which counter For example, metals, such as nickel, Cr, Au, Mo, W, Pt, Ti, aluminum, Cu, and Pd, or an alloy, and Pd, the printed conductor which consists of a metal or a metallic oxide, glass, etc., such as Ag, Au, RuO2, and Pd-Ag, and In2 O3-SnO2 etc. -- semiconductor materials, such as a transparence conductor and polish recon, etc.

are mentioned.
[0028] The pixel size corresponding to [are the indicating equipment which the configuration of the component electrode spacing L1, the component electrode die length W1, and the conductive film 4 etc. is suitably designed according to the application gestalt of this component etc., for example, is mentioned later, and] a screen size with television is designed, and it divides, and pixel size is small and high definition TV requires highly minute. Therefore, while being limited, in order for the size of an electron emission component to obtain sufficient brightness, it is designed so that sufficient emission current may be acquired.
[0029] The component electrode spacing L1 is 10 micrometers of numbers from several micrometers preferably, although the photolithography technique which is from hundreds of A to the base of the process of those with 100 micrometers of numbers and a component electrode, i.e., engine performance, the etching approach, etc. of an exposure machine, is set up with the field strength which can carry out electron emission to the electrical potential difference impressed to component inter-electrode.
[0030] The die length W1 of a component electrode and the thickness d of the component electrodes 5 and 6 are suitably designed from the problem on connection with the resistance of an electrode, X, and Y wiring which were mentioned above, and arrangement of the electron source by which a large number arrangement was carried out, the die length W1 of a component electrode is 100 micrometers of numbers from several micrometers, and the thickness d of the component electrodes 5 and 6 is usually several micrometers from hundreds of A.
[0031] Although between the component electrode 5 which was prepared on the substrate 1 and which counters, and the component electrode 6 and the component electrode 5, and the thin film 4 containing the electron emission section installed 6 top contain the electron emission section 3, they may not be installed not only when shown in (b) of drawing 1 , but on the component electrode 5 and 6. That is, it is the case where a laminating configuration is carried out on the insulating substrate 1 at the order of the thin film 2 for electron emission section formation, and the component electrodes 5 and 6 which counter. Moreover, all component electrode [which counters] 5, and component electrode 6 rooms may function as the electron emission section depending on a process. The thickness of the thin film 4 containing this electron emission section is preferably set [angstroms / several] up suitably from 10A especially preferably by 1000A of numbers according to the resistance between the step coverage to those with 500A, and the component electrodes 5 and 6, the electron emission section 3 and the component electrode 5, and 6 and the particle size of the conductive particle of the electron emission section 3, the energization processing conditions mentioned later. The resistance shows the sheet resistance of the 7th power ohm / ** of 10 from the cube of 10.
[0032] If the example of the ingredient which constitutes the thin film (conductive film) 4 containing the electron emission section is given, Pd, Ru, Ag, Au, Ti, In, Cu, Cr, Fe, Zn, Sn, Ta, Metals, such as W and Pb, PdO and SnO2, In 2O3, PbO, Sb 2O3 etc. -- an oxide, HfB2, ZrB2, and LaB6 -- CeB6, YB4, and GdB4 etc. -- it is semi-conductors, such as nitrides, such as carbide, such as boride, and TiC, ZrC, HfC, TaC, SiC, WC, and TiN, ZrN, HfN, and Si, germanium, carbon, AgMg, NiCu, Pb, Sn, etc., and consists of a particle.
[0033] In addition, the particle film described here is film with which two or more particles gathered, and not only the condition that the particle distributed separately but a particle puts mutually the film in contiguity or the condition (the shape of an island is also included) of having overlapped, as the fine structure.
[0034] In several angstroms, the particle size of a particle is 1000A of numbers, and this better ** is 200A from 10A.
[0035] For example, the electron emission section 3 was formed in some conductive film 4, it is the high resistance sections, such as a crack, and still more preferably, from several angstroms, 100A of numbers, it is dependent on processes, such as thickness of the thin film (conductive film) 4 which may have conductive particle many with a particle size of 500A, and contains the electron emission section, and energization processing conditions mentioned later, from 10A, and is set up especially suitably preferably.
[0036] Moreover, said conductive particle is the same object as all the all [some or] of the ingredient which constitutes the thin film (conductive film) 4 containing the electron emission section.
[0037] Moreover, carbon or a carbon compound has accumulated on the conductive film 4 near a part of electron emission section 3 and also the electron emission section 3.
[0038] Next, the vertical-type surface conductivity-type electron emission component which is a surface conduction mold electron emission component of another configuration of starting this invention is explained.
[0039] Drawing 12 is a typical drawing in which the configuration of a fundamental vertical-type surface conduction mold electron emission component is shown.
[0040] In drawing 12 , the thing of the same sign as drawing 1 is the same. 21 is the **** formation section. A substrate 1, the component electrodes 5 and 6, the thin film 4 containing the electron emission section, and the electron emission section 3 It consists of the same ingredients as the flat-surface mold surface conduction mold electron emission component mentioned above. The **** formation section 21 It consists of insulating ingredients of the SiO2 grade formed by the vacuum deposition method, print processes, a spatter, etc. Although it corresponds to the

component electrode spacing L of the flat-surface mold surface conduction mold electron emission component described previously, and the thickness of the **** formation section 21 is 10 micrometers of numbers and is set up from dozens of nanometers with the field strength which can carry out electron emission to the process of the **** formation section, and the electrical potential difference impressed to component inter-electrode Preferably, it is several micrometers from dozens of nanometers. In order to form the thin film 4 containing the electron emission section after the component electrodes 5 and 6 and **** formation section 21 creation, the laminating of it is carried out on the component electrodes 5 and 6. In addition, in drawing 12 , although the electron emission section 3 is shown in the level difference formation section 21 in the shape of a straight line, it does not restrict a configuration and a location to this depending on creation conditions, energization foaming conditions, etc.

[0041] Although various approaches as the manufacture approach of an electron emission component of having the electron emission section 3 can be considered, the example is shown in drawing 2 . In addition, as for two, for example, the particle film is mentioned with the thin film for electron emission section formation (conductive film) among drawing 2 .

[0042] Hereafter, explanation of the manufacture approach is explained for order based on drawing 1 and drawing 2 later on.

1) By the detergent, pure water, and the organic solvent, form the component electrode material deposition-back by the vacuum deposition method, a spatter, etc. after washing, and fully form the component electrodes 5 and 6 for a substrate 1 on the field of this insulating substrate 1 with a photolithography technique ((a) of drawing 2).

2) Form an organic metal thin film by applying and leaving an organic metal solution on the insulating substrate in which the component electrodes 5 and 6 were formed between the component electrodes 5 and the component electrodes 6 which were prepared on the insulating substrate 1. In addition, an organic metal solution is a solution of the organic compound which uses said metals, such as Pd, Ru, Ag, Au, Ti, In, Cu, Cr, Fe, Zn, Sn, Ta, W, and Pb, as the main element. Then, heating baking processing of the organic metal thin film is carried out, patterning is carried out by lift off, etching, etc., and the thin film 2 for electron emission section formation is formed ((b) of drawing 2). In addition, although it explains by the method of applying an organic metal solution, it is not the object restricted to this and may be formed here by vacuum evaporation technique, a spatter, modified chemical vapor deposition, the distributed applying method, the dipping method, the spinner method, etc.

3) It continues, and if the shape of a pulse and energization processing by ****** are performed by the power source whose electrical potential difference is not illustrated for the energization processing called foaming between the component electrode 5 and 6, the electron emission section 3 from which structure changed will be formed in the part of the thin film 2 for electron emission section formation (conductive film) ((c) of drawing 2). The thin film 2 for electron emission section formation (conductive film) is made to break, deform or deteriorate locally by this energization processing, and the part (high resistance part) where structure changed is called the electron emission section 3.

[0043] Electrical treatment after foaming processing is performed within the measurement evaluation equipment shown in drawing 3 . Measurement evaluation equipment is explained below.

[0044] Drawing 3 is the outline block diagram of the measurement evaluation equipment for measuring the electron emission characteristic of the component which has the configuration shown by drawing 1 . In drawing 3 , the thin film with which a base, and 5 and 6 contain a component electrode, and, as for 4, 1 contains the electron emission section, and 3 show the electron emission section. Moreover, a high voltage power supply for an anode electrode for an ammeter for a power source for 31 to impress the component electrical potential difference Vf to a component and 30 to measure the component current If which flows the component electrode 5 and the thin film 4 containing the electron emission section between six, and 34 to catch the emission current Ie emitted from the electron emission section of a component, and 33 to impress an electrical potential difference to the anode electrode 34, and 32 are the ammeters for measuring the emission current Ie emitted from the electron emission section 3 of a component.

[0045] In measurement of the above-mentioned component current If of an electron emission component, and the emission current Ie, the anode electrode 34 which connected the power source 31 and the ammeter 30 to the component electrodes 5 and 6, and connected the power source 33 and the ammeter 32 above this electron emission component is arranged. Moreover, an electron emission component and the anode electrode 34 are installed in vacuum devices, and the device required for vacuum devices, such as a non-illustrated exhaust air pump and a vacuum gage, possesses them in the vacuum devices, and they can perform measurement evaluation of a component now under a desired vacuum. In addition, an exhaust air pump consists of an ultra-high-vacuum equipment system which turns into further high vacuum equipment systems which do not use the usual high vacuum equipment system which consists of a turbine pump and a rotary pump, or oil, such as a magnetic levitation turbine pump and a dry pump, from an ion pump. Moreover, the whole vacuum devices and an electron source substrate can be heated to 200 degrees C at a non-illustrated heater.

[0046] In addition, the electrical potential difference of an anode electrode measured the distance H of 1kV - 10kV, an

anode electrode, and an electron emission component in 2mm - 8mm.
[0047] Foaming processing may impress an electrical-potential-difference pulse, making the case where a pulse height value impresses the pulse of a constant voltage, and a pulse height value increase. First, the voltage waveform in a pulse height value's impression of the pulse of a constant voltage is shown in (a) of drawing 4 .
[0048] T1 and T2 are the pulse width and pulse separations of a voltage waveform among (a) of drawing 4 , T1 is made into 1 microsecond - 10 mses, they make T2 10 microseconds - 100 mses, and the peak value (peak voltage at the time of foaming) of a triangular wave is chosen suitably, and is impressed under a vacuum ambient atmosphere.
[0049] Next, the voltage waveform in the case of impressing an electrical-potential-difference pulse is shown in (b) of drawing 4 , making a pulse height value increase.
[0050] the inside of (b) of drawing 4 , and T1 and T2 -- the pulse width of a voltage waveform, and pulse separation -- it is -- T1 -- 1 microsecond - 10 mses, and T2 -- 10 microseconds - 100 mses -- carrying out -- the peak value (peak voltage at the time of foaming) of a triangular wave -- every [for example, / 0.1V step extent] -- it is made to increase and impresses under a vacuum ambient atmosphere.
[0051] In addition, termination of foaming processing was, the electrical potential difference of extent, for example, the about [0.1V] electrical potential difference, which does not destroy and deform locally the thin film 2 for electron emission section formation into pulse separation T2, and when a component current was measured, and resistance was calculated, for example, resistance beyond 1M ohm was shown, it considered foaming as termination. The electrical potential difference at this time is made to call it the foaming electrical potential difference Vform.
[0052] Although a triangular wave pulse is impressed to inter-electrode [of a component] and foaming processing is performed in case the electron emission section explained above is formed The wave impressed to inter-electrode [of a component] may not be limited to a triangular wave, and the wave of requests, such as a square wave, may be used. Without restricting to an above-mentioned value also about the peak value and pulse width, and pulse separation, in accordance with the resistance of an electron emission component etc., a desired value is chosen so that the electron emission section may be formed good.
[0053] Moreover, making a pulse height value as shown in (b) of above-mentioned drawing 4 increase, since it is uniquely decided by the ingredient of a component, a configuration, etc., since the energy of foaming with the direction proper for each component in the case of impressing an electrical-potential-difference pulse is obtained easily and the good electron emission characteristic is acquired, this foaming electrical potential difference is desirable.
4) Next, perform processing called activation to the component which foaming ended. Activation is the degree of vacuum of 5th power torr extent of minus [power / of minus of 10 / 4th / -] of 10, and is processing to which it is depositing carbon or a carbon compound, and the component current If and the emission current Ie change from the organic substance with which a pulse height value says the thing of processing which winds and returns impression of the pulse of a constant voltage, and exists in a vacuum like foaming remarkably. Measuring the component current If and the emission current Ie, when the emission current Ie is saturated, activation is ended, for example. The example of an activation time-dependent of the component current If and the emission current Ie is shown in drawing 5 .
[0054] Depending on the pulse voltage which impresses activation to a degree of vacuum and a component, the time-dependent of this component current If and the emission current Ie changes, and deformation and the formation condition of the coat (deposit) to the thin film which deteriorated change with foaming processings.
[0055] Suppose that the case where an activation electrical potential difference impresses and carries out activation of the pulse high enough compared with the foaming electrical potential difference Vform is called high resistance activation. On the other hand, suppose that the case where an activation electrical potential difference impresses and carries out activation of the pulse low enough compared with the foaming electrical potential difference Vform is called low resistance activation. In addition, activation is correctly classified mostly as a boundary in the starting potential VP which shows the voltage-controlled negative resistance mentioned later.
[0056] Although gestalt change of the component in the case of high resistance activation and low resistance activation was observed, mimetic diagrams are (a) of drawing 6 , and (b). In addition, FESEM, TEM, etc. performed the above-mentioned observation.
[0057] (a) of drawing 6 and (b) are the cross sections of high resistance activation and the component at the time of carrying out low resistance activation, respectively. In addition, impression of an electrical potential difference was performed by using 6 as a low voltage lateral electrode, having used 5 as the high potential lateral electrode. In (a) of drawing 6 which shows the case of high resistance activation, carbon or a carbon compound 61 has accumulated by foaming mainly on the conductive film 4 by the side of the high potential electrode 5 from a part of part (high resistance part) 3 which cheated out of deformation of a crack etc., and deterioration on the conductive film 4. Furthermore, if it observes for a high scale factor, it will have deposited also on the outskirts also of a perimeter and the outskirts of a particle. Moreover, it is based on the component inter-electrode distance which counters, and carbon or a carbon compound 61 may accumulate also on a component electrode. 500A or less of the thickness is 300A or less

more preferably.
[0058] In addition, carbon or a carbon compound is graphite (both ** and polycrystal are pointed out) and amorphous carbon (mixture with amorphous carbon and polycrystal graphite is pointed out) here as a result of TEM, Raman, etc.
[0059] On the other hand, in (b) of drawing 6 which shows the case of low resistance activation, carbon or a carbon compound 61 has accumulated on a part of deformation and part 3 made to deteriorate by foaming. Furthermore, if it observes for a high scale factor, it will have deposited also on the outskirts also of a perimeter and the outskirts of a particle.
[0060] In addition, with carbon or a carbon compound, they are graphite (both ** and polycrystal are pointed out) and amorphous carbon (mixture with amorphous carbon and polycrystal graphite is pointed out) like the point here as a result of TEM, Raman, etc.
5) In this way, drive the created electron emission component preferably in the vacuum ambient atmosphere of a degree of vacuum higher than foaming processing and the degree of vacuum which carried out activation. Moreover, the vacuum ambient atmosphere of a degree of vacuum higher than foaming processing and the degree of vacuum which carried out activation is a degree of vacuum which has a degree of vacuum more than the 6th power of the minus torr of about ten preferably, and is a degree of vacuum which is an ultra-high-vacuum system and is not newly [carbon and a carbon compound] deposited mostly more preferably.
[0061] Therefore, by this, it becomes possible to control deposition of the carbon beyond this, and a carbon compound, and the component current If and the emission current Ie are stabilized uniformly.
[0062] In addition, with the component in the case of high resistance activation and low resistance activation, the stability in the early stages of a drive differs, and high resistance activation is more preferably chosen as activation.
[0063] The basic property of the electron emission component in connection with this invention created by the above component configurations and the manufacture approach is explained using drawing 3 and drawing 7 .
[0064] The typical example of the relation between the emission current Ie and the component current If which were measured by the measurement evaluation equipment shown in drawing 3 , and the component electrical potential difference Vf is shown in drawing 7 . In addition, since the emission current Ie is remarkably small compared with the component current If, drawing 7 is shown per arbitration. This electron emission component has three properties over the emission current Ie so that clearly also from drawing 7 .
[0065] First, if this component impresses the component electrical potential difference more than a certain electrical potential difference (Vth in drawing 7 called a threshold electrical potential difference), the emission current Ie will increase rapidly and, on the other hand, the emission current Ie will hardly be detected below on the threshold electrical potential difference Vth by the 1st. That is, it is a nonlinear device with the clear threshold electrical potential difference Vth to the emission current Ie.
[0066] Since the emission current Ie is [2nd] dependent on the component electrical potential difference Vf, the emission current Ie is controllable by the component electrical potential difference Vf.
[0067] It depends for the emission charge caught by the anode electrode 34 the 3rd on the time amount which impresses the component electrical potential difference Vf. That is, the amount of charges caught by the anode electrode 34 is controllable by the time amount which impresses the component electrical potential difference Vf.
[0068] On the other hand, although the component current If may show the property (continuous line of drawing 7) and voltage-controlled negative resistance (it is called VCNR property) property (broken line of drawing 7) which carry out the increment in monotone to the component electrical potential difference Vf (it is called MI property), it depends for the property of these components current on the process. Moreover, the boundary electrical potential difference which shows a VCNR property is called ****.
[0069] The VCNR property of the component current If is the usual vacuum-devices system, and when foaming is performed, it generates. Namely, the property The vacuum ambient atmosphere conditions of the electric conditions at the time of foaming, and a vacuum-devices system etc., Or the vacuum ambient atmosphere conditions of the vacuum-devices system at the time of measurement of the electron emission component which already performed foaming, the electric Measuring condition at the time of measurement (for example, in order to acquire the current-voltage characteristic of an electron emission component) It became clear that it changed a lot depending on the neglect time amount in vacuum devices of the electron emission component of the time of measurement, such as a trace speed when carrying out the sweep of the electrical potential difference impressed to a component from a low battery to the high voltage, etc. Moreover, the emission current Ie shows MI property at this time.
[0070] Since it has an increment property in monotone over the component applied voltage of the property If of the above surface conduction mold electron emission components, i.e., a component current, and the emission current Ie, the electron emission component in connection with this invention can expect the application to the direction of many.
[0071] In addition, in the surface conduction mold electron emission component which distributed and constituted the conductive particle beforehand, the part of the fundamental manufacture approaches of the fundamental component

configuration of said this invention may be changed.
[0072] Although the fundamental configuration of a surface conduction mold electron emission component and the process were described above, if it has three above-mentioned descriptions in the property of a surface conduction form electron emission component according to the thought of this invention, it is not limited to an above-mentioned configuration etc., but can apply also in image formation equipments, such as the below-mentioned electron source and a display.
[0073] Next, the electron source and image formation equipment of this invention are described.
[0074] Two or more electron emission components of this invention are arranged on a substrate, and an electron source or image formation equipment can be constituted.
[0075] Many surface conduction mold electron emission components stated to the method of the array on a substrate for example, in the conventional example are arranged to juxtaposition. Many lines of the electron emission component which connected the both ends of each component with wiring are arranged (it is called a line writing direction). The array gestalt which carries out the control drive of the electron with the control electrode (it is called a grid) installed in the direction which intersects perpendicularly with this wiring in the upper space of (it is called the direction of a train), and this electron source (henceforth) And it calls it a ladder mold, the direction wiring of Y of n is installed through a layer insulation layer after the direction wiring of X of m described below, and the array gestalt which connected the direction wiring of X and the direction wiring of Y to the component electrode of the pair of a surface conduction form electron emission component, respectively is mentioned. This is henceforth called passive-matrix arrangement.
[0076] Next, this passive matrix is explained in full detail.
[0077] According to the description of three fundamental properties which the surface conduction mold electron emission component in connection with this invention mentioned above, the emission electron from a surface conduction mold electron emission component is controlled by the peak value and width of a pulse-like electrical potential difference which are impressed to the component inter-electrode which counters above a threshold electrical potential difference. On the other hand, it is hardly emitted below on a threshold electrical potential difference. If the above-mentioned pulse-like electrical potential difference is suitably impressed to each component when many electron emission components have been arranged according to this property, according to an input signal, a surface conduction mold electron emission component will be chosen, and that amount of electron emission can be controlled.
[0078] Hereafter, the configuration of the electron source substrate constituted based on this principle is explained using drawing 8 .
[0079] The direction wiring 82 of X of m consists of DX1, DX2, --DXm, it forms by the vacuum deposition method, print processes, a spatter, etc. on the insulating substrate 1, and consists of a conductive metal considered as the desired par turn, and an ingredient, thickness, and wiring width are set as the appearance by which an almost equal electrical potential difference is supplied to many surface conduction mold electron emission components. The direction wiring 83 of Y consists of DY1, DY2, and wiring of n of --DYn, like the direction wiring 82 of X, it forms by the vacuum deposition method, print processes, a spatter, etc., and consists of a conductive metal considered as the desired par turn, and an ingredient, thickness, wiring width, etc. are set as the appearance by which an almost equal electrical potential difference is supplied to many surface conduction mold electron emission components. A non-illustrated layer insulation layer is installed between the direction wiring 82 of X and the direction wiring 83 of Y of n of these m, it dissociates electrically, and matrix wiring is constituted (this m and n are [both] a positive integer).
[0080] SiO2 in which the non-illustrated layer insulation layer was formed by the vacuum deposition method, print processes, a spatter, etc. etc. -- it is -- it is formed in the whole surface or some of insulating substrate 1 in which the direction wiring 82 of X was formed, in a desired configuration, and thickness, an ingredient, and a process are suitably set up so that the potential difference of the intersection of the direction wiring 82 of X and the direction wiring 83 of Y can be borne especially. The direction wiring 82 of X and the direction wiring 83 of Y are pulled out as an external terminal, respectively.
[0081] Furthermore, the electrode (un-illustrating) with which the surface conduction mold electron emission component 84 counters is electrically connected like the above-mentioned by the direction wiring 82 (DX1, DX2, --DXm) of X of m, the direction wiring 83 (DY1, DY2, --DYn) of Y of n, and the connection 85 that consists of a conductive metal formed by the vacuum deposition method, print processes, a spatter, etc.
[0082] The conductive metal of m the direction wiring 82 of X, the direction wiring 83 of Y of n and connection 85, and the component electrode which counters here Some or all of the configuration element may be the same, or may differ, respectively. Metals, such as nickel, Cr, Au, Mo, W, Pt, Ti, aluminum, Cu, and Pd, or an alloy, and Pd, the transparence of the printed conductor which consists of a metal or a metallic oxide, glass, etc., such as Ag, Au, RuO2, and Pd-Ag, and In2O3-SnO2 grade -- it is suitably chosen from semiconductor materials, such as a conductor and polish recon, etc. Moreover, a surface conduction mold electron emission component may be formed in whichever on the insulating substrate 1 or a non-illustrated layer insulation layer.

[0083] Moreover, in detail, although mentioned later In said direction wiring 82 of X, the line of the surface conduction mold electron emission component 84 arranged in the direction of X It connects with a scan signal impression means by which it does not illustrate for impressing the scan signal for scanning according to an input signal, electrically. On the other hand, for the direction wiring 83 of Y It connects with a modulating-signal generating means by which it does not illustrate for impressing the modulating signal for modulating each train of the train of the surface conduction mold electron emission component 84 arranged in the direction of Y according to an input signal, electrically.
[0084] Furthermore, the driver voltage impressed to each component of a surface conduction mold electron emission component is supplied as a difference electrical potential difference of the scan signal impressed to the component concerned, and a modulating signal.
[0085] Next, the image formation equipment used for the electron source using the electron source substrate created as mentioned above, a display, etc. is explained using drawing 9 and drawing 10 . Drawing 9 is the basic block diagram of image formation equipment, and drawing 10 is a fluorescent screen.
[0086] In drawing 9 , the face plate with which, as for the rear plate with which 1 fixed the substrate and 91 fixed the substrate 1, and 96, the fluorescent screen 94 and the metal back 95 grade were formed in the inside of a glass substrate 93, and 92 are housings, they are applying frit glass etc. and calcinating it 10 minutes or more at 400-500 degrees C in atmospheric air or nitrogen, seal the rear plate 91, a housing 92, and a face plate 96, and constitute an envelope 98.
[0087] In drawing 9 , 84 is equivalent to the surface conduction mold electron emission component shown in drawing 1 or drawing 12 . 82 and 83 are the direction wiring of X and the direction wiring of Y which were connected with the component electrode of the pair of a surface conduction form electron emission component. Moreover, it may be called a component electrode when wiring to these components electrode has a component electrode and the same wiring material.
[0088] Although the envelope 98 was constituted from a face plate 96, a housing 92, and a rear plate 91 like ****, since the rear plate 91 is formed in order to mainly reinforce the reinforcement of a substrate 1, when it has reinforcement sufficient by substrate 1 the very thing, the rear plate 91 of another object of the envelope 98 is unnecessary, it seals the direct housing 92 in a substrate 1, and may constitute an envelope 98 from a face plate 96, a housing 92, and a substrate 1.
[0089] Drawing 10 is a fluorescent screen. In the case of monochrome, it consists only of a fluorescent substance, but in the case of the fluorescent screen of a color, a fluorescent screen 94 consists of the black **** material 101 and fluorescent substances 102 which are called a black stripe or a black matrix by the array of a fluorescent substance. The purposes in which a black stripe and a black matrix are prepared are it not being conspicuous and carrying out color mixture etc. by distinguishing by different color between each fluorescent substance 102 of the three-primary-colors fluorescent substance which is needed in the case of color display with, and making the section black, and controlling the fall of the contrast by the outdoor daylight reflection in a fluorescent screen 94. There is not only the ingredient that uses as a principal component the graphite usually well used as an ingredient of a black stripe but conductivity, and if transparency and reflection of light are few ingredients, it will not restrict to this.
[0090] The approach of applying a fluorescent substance to a glass substrate 93 is not based on monochrome and a color, but settling and print processes are used.
[0091] Moreover, the metal back 95 is usually formed in the inside side of a fluorescent screen 94. The metal back's purpose is protection of the fluorescent substance from the damage by the collision of the anion generated within acting as an electrode for impressing improving brightness and electron beam acceleration voltage and an envelope etc. by carrying out specular reflection of the light by the side of an inside to a face plate 96 side among generating of a fluorescent substance. The metal back performs data smoothing (usually called filming) of the inside side front face of a fluorescent screen after fluorescent screen production, and it can produce by depositing A1 with vacuum deposition etc. after that.
[0092] In order to raise the conductivity of a fluorescent screen 94 to a face plate 96 further, a transparent electrode (un-illustrating) may prepare in the external surface side of a fluorescent screen 94.
[0093] In case the above-mentioned sealing is performed, in order to have to make each color fluorescent substance and an electron emission component correspond, in the case of a color, it is necessary to perform sufficient alignment.
[0094] An envelope 98 is made into the about [a minus 6 power torr] degree of vacuum of 10 through a non-illustrated exhaust pipe, and the closure of an envelope 98 is performed.
[0095] In addition, the component of drawing 1 which formed the electron emission section as mentioned above, or drawing 12 an electron source substrate Although it arranges and wired like the above on the substrate, preferably The component before electron emission section formation, On a substrate the component in the condition of having been carried out by making it (b) of drawing 2 , like the above For example, arrangement, Wire, and after arranging this in the envelope 98 shown in drawing 9 , a non-illustrated exhaust pipe is led. By the usual vacuum-devices system which makes a rotary pump and a turbine pump a pump system, for example, the inside of this envelope Consider as the about

[a minus 6 power torr] degree of vacuum of 10, and an electrical potential difference is impressed between the component electrode 5 and 6 ((b) of drawing 2) through the container outer edge child Dox1 thru/or Doxm, Doy1, or Doyn. By performing above-mentioned foaming, next performing the inside of this envelope for said activation as an about [a minus 6 power torr] degree of vacuum of ten, the electron emission section 3 is formed and an electron source substrate is produced.

[0096] It changes with the ultra-high-vacuum equipment system made into pump systems, such as an ion pump, after production as mentioned above, for example, performing baking at 80 - 150 degrees after that especially for 3 to 15 hours. The change of an ultra-high-vacuum system and baking are for satisfying the increment property in monotone of the component current If of the above-mentioned surface conduction mold electron emission component, and the emission current Ie (MI property), and the approach and conditions are not restricted to this. Moreover, getter processing may be performed in order to maintain the degree of vacuum after the closure of an envelope 98. This is processing which heats the getter arranged at the position in an envelope 98 (un-illustrating), and forms the vacuum evaporationo film by the heating methods, such as resistance heating or high-frequency heating, after the closure, just before performing the closure of an envelope 98. Ba etc. is usually a principal component and a getter maintains the degree of vacuum of the 5th power of 1x10 minus, and the 7th power of 1x10 minus [Torr] by the absorption of this vacuum evaporationo film.

[0097] Through the container outer edge child Dox1 thru/or Doxm, Doy1, or Doyn, by impressing an electrical potential difference, carry out electron emission, and impress the high pressure of several kV or more to the metal back 95 or a transparent electrode (un-illustrating) through a secondary terminal Hv, accelerate an electron beam for each electron emission component, it is made to collide with a fluorescent screen 94 for it, and an image is displayed on it by making light excite and emit in the image display device of this invention completed by the above.

[0098] The configuration described above is an outline configuration required when producing the suitable image formation equipment used for a display etc., for example, detailed parts, such as an ingredient of each part material, are not restricted to the above-mentioned contents, and they are suitably chosen so that it may be suitable for the application of image equipment.

[Translation done.]

EXAMPLE

[Example] An example is raised to below and this invention is explained further in full detail.
[0100] (Example 1) The configuration of the fundamental surface conduction mold electron emission component in connection with this invention is the same as that of the top view of (a) of drawing 1 , and (b), and a sectional view.
[0101] In addition, on the substrate 1, as the component of the same configuration shows drawing 11 , four pieces are formed. In addition, in drawing 11 , the thing of the same number as drawing 1 shows the same thing.
[0102] The manufacturing method of the surface conduction form electron emission component concerning this invention is the same as that of drawing 2 fundamentally. Hereafter, the fundamental configuration and fundamental manufacturing method of a component concerning this invention are explained using drawing 1 and drawing 2 .
[0103] In drawing 1 , the thin film with which a substrate, and 5 and 6 contain a component electrode and, as for 4, 1 contains the electron emission section, and 3 are the electron emission sections.
[0104] Hereafter, explanation of the manufacture approach is explained for order based on drawing 1 and drawing 2 later on.
[0105] Process-a: The pattern which should serve as the component electrode 5 and the component inter-electrode gap G was formed by the photoresist (RD-2000N-41 Hitachi Chemical Co., Ltd. make) on the substrate 1 which formed silicon oxide with a thickness of 0.5 microns by the spatter on the defecated blue plate glass, and the sequential deposition of Ti with a thickness of 50A and the 1000Anickel in thickness was carried out with the vacuum deposition method. The photoresist pattern was dissolved by the organic solvent, lift off of the nickel/Ti deposition film was carried out, the component electrode spacing G was made into 3 microns, and the component electrodes 5 and 6 which have 300 microns for the width of face W1 of a component electrode were formed ((a) of drawing 2).
[0106] Process-b: The Cr film 121 of 1000A of thickness was carried out deposition and patterning vacuum deposition with the mask which has opening in electrode gap between components G, and this near, and heating baking processing for 10 minutes was carried out for organic [Pd] (ccp4230 Okuno Pharmaceuticals company make) at rotation spreading and 300 degrees C with the spinner on it. Moreover, the thickness of the thin film 2 for electron emission section formation which consists of a particle which consists of Pb as a main element formed in this way was 100A, and sheet resistance was 4th power omega /** of 2x10. In addition, as the particle film described here was mentioned above, it is the film with which two or more particles gathered, and not only the condition that the particle distributed separately but a particle puts mutually contiguity or the film in the condition (the shape of an island is also included) of having overlapped, as the fine structure, and the particle size means the path about the particle which can recognize particle shape in said condition.
[0107] The process-c:Cr film and the thin film 2 for electron emission section formation after baking were etched by acid etchant, and the desired pattern was formed. The component electrodes 5 and 6 and the thin film 2 grade for electron emission section formation were formed on the substrate 1 according to the above process ((b) of drawing 2).
[0108] After having installed in process-d:, next the measurement evaluation equipment of drawing 3 , exhausting with the vacuum pump and reaching the degree of vacuum of the 5th power of the minus torr of 2x10, between each component electrode 5 and 6, the electrical potential difference was impressed, respectively and four elements [power source / 31 / for impressing the component electrical potential difference Vf to a component] carried out energization processing (foaming processing). The voltage waveform of foaming processing is shown in (b) of drawing 4 .
[0109] T1 and T2 were the pulse width and pulse separations of a voltage waveform among (b) of drawing 4 , in this example, T1 was made into 1 ms, they made T2 10 mses, the pressure up of the peak value (peak voltage at the time of foaming) of a square wave was carried out at 0.1V step, and it performed foaming processing. Moreover, during foaming processing, to coincidence, it was the electrical potential difference of 0.1V, and the resistance measurement pulse was inserted among T2, and resistance was measured. in addition, termination of foaming processing -- the measured value in a resistance measurement pulse -- about 1 -- it considered as the time of becoming M ohms or more, and impression of the electrical potential difference to a component was ended to coincidence. The foaming electrical

potential differences Vform of each component were 5.1V, 5.0V, 5.0V, and 5.15V.
[0110] To process-e:, then four elements which carried out foaming processing, peak value of a square wave was carried out by the wave of (b) of drawing 4 , and activation was carried out by 4V and every two 14 V each, respectively. The component sample which carried out activation by Component A and high resistance activation, 14V [i.e.,], for low resistance activation, i.e., the component sample which carried out activation by 4V, will be called Component B.
[0111] With activation, the pulse voltage was impressed to the appearance mentioned above within the measurement evaluation equipment of drawing 3 component inter-electrode, measuring the component current If and the emission current Ie. In addition, the degree of vacuum in the measurement evaluation equipment of drawing 3 was the 5th power of the minus torr of 1.5x10 at this time. Activation was ended in about 30 minutes.
[0112] In this way, the electron emission section 3 was formed and the electron emission component was produced.
[0113] In order to grasp the property and gestalt of a surface conduction form electron emission component which were produced at the above-mentioned process, the measurement evaluation equipment of above-mentioned drawing 3 was used for the above-mentioned components A and B, and measurement of the one-piece each every electron emission characteristic was performed. Moreover, every one remaining pieces were observed with the electron microscope.
[0114] In addition, the degree of vacuum in 1kV and the vacuum devices at the time of electron emission characteristic measurement was carried out [the distance between electron emission components] for the potential of 4mm and an anode electrode to the anode electrode the 6th power of the minus torr of 1x10. Components A and B impressed the component electrical potential difference 14V among electrodes 5 and 6, and measured the component current If and the emission current Ie which flow then. With Component A, the about 10mA component current If flowed immediately after measurement initiation, it decreased gradually, and the emission current Ie was observed in connection with it. On the other hand with Component B, the stable component current If and the emission current Ie were observed from the early stages of measurement, in component electrical-potential-difference 14V, the component current If was set to 2.0mA, the emission current Ie was set to 1.0microA, and electron emission effectiveness eta=Ie/If x100(%) was 0.05%. As mentioned above, although Component A has the remarkably large component current If and it is unstable in the early stages of measurement, on the other hand with Component B, it turns out that it is an electron emission component more stable than the early stages of measurement with the sufficient effectiveness eta.
[0115] Moreover, when the component current If and the emission current Ie were measured having returned to the 5th power of minus of the degree of vacuum 1.5x10 of activation, and carrying out the ** mark of the electrical potential difference to a component by the about 0.005Hz triangular wave about Component B, the property of the broken line shown in drawing 7 was shown. Like, till around about 5v, after [whose component current If carried out the increment in monotone] being shown in drawing 7 , it shows voltage-controlled negative resistance more than by 5V. At this time, the electrical potential difference (referred to as VP) the component current If indicates max to be is 5V. Moreover, the component current If was several [1/] of about 1mA of the greatest component current more than in 10V. The gestalt of the components A and B observed with the electron microscope is the same as that of what was shown in (a) of drawing 6 , and (b). (B) of drawing 6 shows that many coats (deposit) 61 are formed for a part of affected zone [three] of the component inter-electrode thin film (conductive film) 4 with Component A. On the other hand, with Component B, the coat (deposit) 61 was mainly especially formed for a part of affected zone [three] from (a) of drawing 6 depending on the impression direction of the electrical potential difference to the component at the time of activation in the conductive film 4 top by the side of the high potential electrode 5. It seemed that furthermore, this coat was formed also between the perimeter of a metal particle, and the particle if it observes by FESEM (the abbreviation for a secondary electron microscope) of a high scale factor.
[0116] In addition, when observed by TEM (transmission electron microscope) Raman etc., graphite and the carbon coat which consists of amorphous carbon were observed.
[0117] Moreover, since it activated below on the electrical potential difference **** which shows the voltage-controlled negative resistance described previously with Component A by these observation, Much carbon is formed in a part of affected zone of the thin film generated by foaming processing from Component B, and a remarkable big component current flows. On a measurement electrical potential difference The carbon coat formed between the high potential side of a thin film affected zone and the low voltage side serves as current pass, a several times as many component current as Component B flows, and it is thought that the component current was changed from the early stages of a drive.
[0118] On the other hand, with the component B which performed high resistance activation, since it activated above the electrical potential difference **** which shows the voltage-controlled negative resistance described previously, though a carbon coat is formed in a part of affected zone at the component A said appearance, it is thought that there are many parts where the carbon coat was partially cut from Component A electrically. For this reason, it is thought that it became the current stabilized from the early stages of a drive.

[0119] As mentioned above, the component current If and the emission current Ie were stabilized, and efficient electron emission was created by high resistance activation.
[0120] (Example 2) This example is an example of the image formation equipment which carried out passive-matrix arrangement of many surface conduction form electron emission components.
[0121] Some top views of an electron source are shown in drawing 13 . Moreover, the A-A' sectional view in drawing is shown in drawing 14 . However, what showed the same notation by drawing 13 , drawing 14 , drawing 15 , and drawing 16 shows the same thing. As for a component electrode and 141, the direction wiring of X corresponding to Dxm of drawing 8 in 82 corresponding to a substrate in 1 (it is also called bottom wiring), the direction wiring (it is also called upper wiring) of Y corresponding to Dyn of drawing 8 in 83, the thin film with which 4 contains the electron emission section, and 5 and 6 are [a layer insulation layer and 142] the contact holes for the component electrode 5, the bottom wiring 82, and electrical installation here.
[0122] Next, drawing 15 and drawing 16 explain the manufacture approach concretely according to the order of a process.
[0123] Process-a : on the substrate 1 which formed silicon oxide with a thickness of 0.5 microns by the spatter on the defecated blue plate glass After carrying out the laminating of Cr with a thickness of 50A and the Au with a thickness of 6000A one by one with vacuum deposition, After BEKU [it / with a spinner / rotation-applying a photoresist (AZ1370 Hoechst A.G. make) and], a photo mask image is exposed and developed. The resist pattern of the bottom wiring 82 is formed, wet etching of the Au/Cr deposition film is carried out, and the wiring 82 under a desired configuration is formed ((a) of drawing 15).
[0124] The layer insulation layer 141 which consists of process-b:, next silicon oxide with a thickness of 1.0 microns is deposited by RF spatter ((b) of drawing 15).
[0125] Process-c: Make the photoresist pattern for forming a contact hole 142 in the silicon oxide deposited at said process b, etch the layer insulation layer 141 by making this into a mask, and form a contact hole 142. RIE (Reactive Ion Etching) for which etching used CF4 andH2 gas -- it was based on law ((c) of drawing 15).
[0126] Process-d: After that, the pattern which should serve as the component electrode 5 and the component inter-electrode gap G was formed by the photoresist (RD-2000N-41 Hitachi Chemical Co., Ltd. make), and the sequential deposition of Ti with a thickness of 50A and the nickel with a thickness of 1000A was carried out with the vacuum deposition method. The photoresist pattern was dissolved by the organic solvent, lift off of the nickel/Ti deposition film was carried out, and the component electrode spacing G made 300 microns width of face W1 of 3 microns and a component electrode, and formed the component electrodes 5 and 6 ((d) of drawing 15).
[0127] Process-e: After forming the photoresist pattern of the upper wiring 83 on the component electrodes 5 and 6, Ti with a thickness of 50A and Au with a thickness of 5000A were deposited with vacuum deposition one by one, lift off removed the unnecessary part, and the upper wiring 84 of a desired configuration was formed ((e) of drawing 16).
[0128] Process-f: The Cr film 151 of 1000A of thickness was carried out deposition and patterning with vacuum deposition, and heating baking processing for 10 minutes was carried out for organic [Pd] (ccp4230 Okuno Pharmaceuticals company make) at rotation spreading and 300 degrees C with the spinner on it. Moreover, the thickness of the thin film 2 for electron emission section formation which consists of a particle which consists of Pd as a main element formed in this way was 85A, and sheet resistance was 4th power omega /** of 3.9x10. In addition, as the particle film described here was mentioned above, it is the film with which two or more particles gathered, not only the condition that the particle distributed separately but a particle puts mutually contiguity or the film in the condition (the shape of an island is also included) of having overlapped, as the fine structure, and the particle size means the path about the particle which can recognize particle shape in said condition ((f) of drawing 16).
[0129] The process-g:Cr film 151 and the thin film 2 for electron emission section formation after baking were etched by acid etchant, and the desired pattern was formed ((g) of drawing 16).
[0130] Process-h: A pattern which applies a resist in addition to contact hole 142 part was formed, and the sequential deposition of Ti with a thickness of 50A and the Au with a thickness of 5000A was carried out with vacuum deposition. The contact hole 142 was embedded by removing an unnecessary part by lift off ((h) of drawing 16).
[0131] The bottom wiring 82, the layer insulation layer 141, the upper wiring 83, the component wiring 5 and 6, and the thin film 2 grade for electron emission section formation were formed on the insulating substrate 1 according to the above process.
[0132] Next, the example which constituted the electron source and the display is explained using drawing 9 and drawing 10 using the electron source substrate created as mentioned above.
[0133] After fixing the substrate 1 which produced the component as mentioned above on the rear plate 91, To 5mm upper part of a substrate 1, a face plate 96 (a fluorescent screen 94 and the metal back 95 are formed and constituted by the inside of a glass substrate 93) is arranged through a housing 92. Frit glass was applied to the joint of a face plate 96, a housing 92, and the rear plate 91, and it sealed by calcinating 10 minutes or more at 400 degrees C thru/or 500

degrees C in atmospheric air or nitrogen-gas-atmosphere mind. Moreover, frit glass also performed immobilization of the substrate 1 to the rear plate 91.
[0134] In this example, 84 of drawing 9 is an electron emission component before electron emission section formation (for example, it is equivalent to (b) of drawing 2), and 82 and 83 are component wiring of the direction of X, and the direction of Y, respectively.
[0135] In the case of monochrome, it consisted only of the fluorescent substance, but in this example, the fluorescent substance adopted the stripe configuration ((a) of drawing 10), and the fluorescent screen 94 formed the black stripe previously, applied each color fluorescent substance to the gap section, and produced the fluorescent screen 94. The ingredient which uses as a principal component the graphite used well was usually used as an ingredient of a black stripe. The approach of applying a fluorescent substance to a glass substrate 93 used slurry method.
[0136] Moreover, the metal back 95 is usually formed in the inside side of a fluorescent screen 94. The metal back performed data smoothing (usually called filming) of the inside side front face of a fluorescent screen after fluorescent screen production, and it produced by carrying out vacuum deposition of A1 after that.
[0137] In order to raise the conductivity of a fluorescent screen 94 to a face plate 96 further, the transparent electrode (un-illustrating) prepared in the external surface side of a fluorescent screen 94, and there was also a **** case in it, but in this example, since conductivity sufficient in just the metal back was acquired, it omitted.
[0138] When performing the above-mentioned sealing, in the case of the color, sufficient alignment was performed in order to have to make each color fluorescent substance and an electron emission component correspond.
[0139] After exhausting the ambient atmosphere in the glassware completed as mentioned above with the vacuum pump through the exhaust pipe (not shown) and reaching sufficient degree of vacuum, the electrical potential difference was impressed between the electrode 5 of the electron emission component 74, and 6 through the container outer edge child Dxo1 thru/or Doxm, Doy1, or Doyn, and foaming processing of the thin film 2 for electron emission section formation was carried out. The voltage waveform of foaming processing is the same as that of (b) of drawing 4 .
[0140] In this example, T1 was made into 1 ms, T2 was made into 10 mses, and it carried out under the vacuum ambient atmosphere of the 5th power of the minus torr of about 1x10.
[0141] Thus, the created electron emission section 3 changed into the condition that the particle which uses a palladium element as a principal component was distributed, and the mean particle diameter of the particle was 30A.
[0142] Next, by the same square wave as foaming, high resistance activation was performed wave height 14V with the degree of vacuum of the 5th power of the minus torr of a degree of vacuum 2x10, measuring the component current If and the emission current Ie.
[0143] Foaming and activation were performed, the electron emission section 3 was formed, and the electron emission component 84 was produced.
[0144] Next, it exhausted to the about [a minus 6 power torr] degree of vacuum of 10, and welded by heating a non-illustrated exhaust pipe with a gas burner, and the closure of an envelope was performed.
[0145] In order to maintain the degree of vacuum after the closure finally, getter processing was performed by the high-frequency-heating method.
[0146] In the image display device of this invention completed as mentioned above for each electron emission component Through the container outer edge child Dx1 Dxm and Dy1 thru/or Dyn by impressing a scan signal and a modulating signal from a signal generation means by which it does not illustrate, respectively Carried out electron emission, and impressed the high pressure of 5kV or more to the metal back 95 through the secondary terminal Hv, accelerated the electron beam, it was made to collide with a fluorescent screen 99, and the image was displayed by making light excite and emit. Moreover, both sides showed the continuous line of drawing 7 , and the component current If and the emission current Ie were stable from the early stages of a drive. Moreover, it was the emission current which can respond also to brightness 100fL-150fL required of television at this time.
[0147] (Example 3) Drawing 17 is drawing to show an example of the display constituted so that the image information with which the display panel which used the surface conduction form electron emission component of said explanation as an electron source is provided from the various sources of image information including television broadcasting could be displayed. A display panel and 17101 17100 among drawing 17 The drive circuit of a display panel, A display controller and 17103 17102 Gore PUREKUSA, A decoder and 17105 17104 An input/output interface circuit, 17106 an image generation circuit, 17108, and 17109 and 17110 for CPU and 17107 An image memory interface circuitry, As for an image input interface circuitry, and 17112 and 17113, 17111 is [TV signal receive circuit and 17114] the input sections (in addition, this display). For example, although voice is naturally reproduced to a display and coincidence of an image when receiving the signal which contains both image information and speech information like a television signal explanation is omitted about a circuit, a loudspeaker, etc. about reception, separation, playback, storage, etc. of the speech information which is not directly related to the description of this invention. .
[0148] Hereafter, the function of each part is explained in accordance with the flow of a picture signal.

[0149] First, the TV signal receive circuit 17113 is a circuit for receiving TV picture signal transmitted using radio-transmission systems, such as an electric wave and space optical communication. Especially the method of TV signal to receive may be restricted and many methods, such as not a thing but NTSC system, a PAL system, and an SECAM system, are sufficient as it. Moreover, TV signal (for example, the so-called high definition TV including MUSE) which consists of these from much scanning lines further is a suitable source of a signal to employ the advantage of said display panel suitable for large-area-izing or large pixel number-ization efficiently. TV signal received by the TV signal receive circuit 17113 is outputted to a decoder 17104.
[0150] Moreover, the TV signal receive circuit 17112 is a circuit for receiving TV picture signal transmitted using cable-transmission systems, such as a coaxial cable and an optical fiber. Like said TV signal receive circuit 17113, especially the method of TV signal to receive is not restricted and TV signal received in this circuit is also outputted to a decoder 17104.
[0151] Moreover, the picture signal which the image input interface circuitry 17111 is a circuit for incorporating the picture signal supplied from picture input devices, such as a TV camera and an image reading scanner, and was incorporated is outputted to a decoder 17104.
[0152] Moreover, the picture signal which the image memory interface circuitry 17110 is a circuit for incorporating the picture signal memorized by the video tape recorder (it omits Following VTR), and was incorporated is outputted to a decoder 17104.
[0153] Moreover, the picture signal which the image memory interface circuitry 17109 is a circuit for incorporating the picture signal memorized by the videodisk, and was incorporated is outputted to a decoder 17104.
[0154] Moreover, the static-image data which are a circuit for incorporating a picture signal and were incorporated are inputted into a decoder 17104 from the equipment with which the image memory interface circuitry 17108 has memorized static-image data like the so-called still picture disk. Moreover, the input/output interface circuit 17105 is a circuit for connecting this display and output units, such as an external computer, a computer network, or a printer. Not to mention performing I/O of image data, or an alphabetic character and graphic form information, it is also possible to perform a control signal, I/O of numeric data, etc. between CPUs17106 and the exteriors with which this indicating equipment is equipped depending on the case.
[0155] moreover, the image data, and an alphabetic character and graphic form information that the image generation circuit 17107 is inputted from the outside through said input/output interface circuit 17105 -- or it is a circuit for generating the image data for a display based on the image data, and the alphabetic character and graphic form information which are outputted from CPU17106. The circuit required for generation including images, such as rewritable memory for accumulating image data, and an alphabetic character and graphic form information, read-only memory the image pattern corresponding to a character code is remembered to be, and a processor for performing an image processing, is included in the interior of this circuit.
[0156] Although the image data for a display generated by this circuit is outputted to a decoder 17104, it is also possible to output to an external computer network and an external printer through said input/output interface circuit 17105 depending on the case.
[0157] Moreover, CPU17106 mainly does the activity in connection with the motion control of this display, generation of a display image, selection, or edit.
[0158] For example, a control signal is outputted to a multiplexer 17103, and the picture signal displayed on a display panel is chosen suitably, or is combined. moreover, the picture signal displayed in that case -- responding -- the display-panel controller 17102 -- receiving -- a control signal -- generating -- a screen-display frequency, a scan method (for example, is it an interlace or non-interlaced?), and a stroke -- actuation of displays, such as the number of the scanning lines of a field, is controlled suitably.
[0159] Moreover, the direct output of image data, or an alphabetic character and graphic form information is carried out, or an external computer and memory are accessed through said input/output interface circuit 17105 to said image generation circuit 17107, and image data, and an alphabetic character and graphic form information are inputted. In addition, of course, CPU17106 may be concerned also with the activity of the purposes other than this. For example, it may be directly concerned with the function which generates information or is processed like a personal computer or a word processor. Or as mentioned above, it may connect with an external computer network through the input/output interface circuit 17105, for example, the activity of numerical calculation etc. may be done in cooperation with an external instrument.
[0160] Moreover, the input section 17114 is for a user to input an instruction, a program or data, etc. into said CPU17106, for example, can use various input devices, such as a keyboard, a joy stick besides a mouse, a bar code reader, and a voice recognition unit.
[0161] Moreover, a decoder 17104 is a circuit for carrying out inverse transformation of the various picture signals inputted from said 17107 thru/or 17113 to a three-primary-colors signal or a luminance signal and an I signal, and a Q

signal. In addition, all over this drawing, as a dotted line shows, as for a decoder 17104, it is desirable to equip the interior with an image memory. This is for treating TV signals which face carrying out inverse transformation and need an image memory including MUSE.
[0162] Moreover, it is because the advantage that image processings and edits including infanticide of an image, interpolation, expansion, contraction, and composition can be easily performed now in cooperation with said image generation circuit 17107 and CPU17106 is born or the display of a still picture becomes easy by having an image memory.
[0163] Moreover, a multiplexer 17103 chooses a display image suitably based on the control signal inputted from said CPU17106. Namely, a multiplexer 17103 chooses [from] a desired picture signal among the picture signals which are inputted from a decoder 17104 and by which inverse transformation was carried out, and outputs it to the drive circuit 17101. In that case, it is also possible by changing and choosing a picture signal within 1 screen-display time amount to display the image which divides one screen into two or more fields, and changes with fields like the so-called multi-screen television.
[0164] Moreover, the display-panel controller 17102 is a circuit for controlling actuation of the drive circuit 17101 based on the control signal inputted from said CPU17106.
[0165] First, as a thing in connection with fundamental actuation of a display panel, the signal for controlling the operating sequence of the power source for a drive of a display panel (not shown), for example is outputted to the drive circuit 17101. Moreover, the signal for controlling for example, a screen-display frequency and a scan method (for example, is it an interlace or non-interlaced?) is outputted to the drive circuit 17101 as a thing in connection with the drive approach of a display panel.
[0166] Moreover, depending on the case, the control signal in connection with adjustment of the brightness and contrast of a display image, a color tone, or the image quality of sharpness may be outputted to the drive circuit 17101.
[0167] Moreover, the drive circuit 17101 is a circuit for generating the driving signal impressed to a display panel 17100, and operates based on the picture signal inputted from said multiplexer 17103, and the control signal inputted from said display-panel controller 17102.
[0168] As mentioned above, although the function of each part was explained, it is possible to display the image information inputted from the various sources of image information in this indicating equipment by the configuration illustrated to drawing 17 on a display panel 17100. That is, after inverse transformation of various kinds of picture signals including television broadcasting is carried out in a decoder 17104, they are suitably chosen in a multiplexer 17103 and are inputted into the drive circuit 17101. On the other hand, a display controller 17102 generates the control signal for controlling actuation of the drive circuit 17101 according to the picture signal to display. The drive circuit 17101 impresses a driving signal to a display panel 17100 based on the above-mentioned picture signal and a control signal. Thereby, an image is displayed in a display panel 17100. These the actuation of a series of is controlled by CPU17106 in generalization.
[0169] Moreover, in this indicating equipment, it is possible in it not only displaying the image memory built in said decoder 17104, and the thing chosen from the image generation circuit 17107 and information, but carrying out edits including an image, such as composition including image processings, such as expansion, contraction, rotation, migration, edge enhancement, infanticide, interpolation, color conversion, and aspect ratio conversion of an image, elimination, connection, exchange, and fitting, as opposed to the image information to display. Moreover, although especially explanation of this example did not describe, the specialized circuit for performing processing and edit also about speech information may be prepared like the above-mentioned image processing or image edit.
[0170] Therefore, this indicating equipment can have functions, such as terminal equipments for office work including the image edit device treating the display device of television broadcasting, the terminal equipment of a television conference, a static image, and a dynamic image, the terminal equipment of a computer, and a word processor, and a game machine, by one set, and its application range is very wide as industrial use or a noncommercial use.
[0171] In addition, it cannot be overemphasized that it is not what does not pass over above-mentioned drawing 17 for an example of the configuration of the display using the display panel which makes a display conduction type emission component the source of an electron beam to have been shown, but is limited only to this. For example, even if it excludes the circuit in connection with the function which does not have the purpose-of-use top need among the components of drawing 17 , it does not interfere. Moreover, contrary to this, a component may be further added depending on the purpose of use. For example, when applying this indicating equipment as a TV phone machine, it is suitable to add the transceiver circuit containing a television camera, a voice microphone, a lighting machine, and a modem etc. to a component.
[0172] In this indicating equipment, since the formation of a thin form of the display panel which especially makes a surface conduction form electron emission component the source of an electron beam is easy, depth of an indicating equipment can be made small. Big-screen-izing is easy for the display panel which makes a surface conduction form

electron emission component the source of an electron beam in addition to it, and since brightness is highly excellent also in an angle-of-visibility property, this display can display the image which was rich in overflow force with sufficient visibility on presence.

[0173] (Example 4) This examples are many surface conduction mold electron emission components and an example of the image formation equipment which has a control electrode (grid).

[0174] Since the manufacture approach of the image formation equipment of this example was produced by the approach almost equivalent to an example 2, it carries out the detail of the explanation.

[0175] First, the example of the electron source which prepared many surface conduction form electron emission components on the substrate, and the display adapting this is explained. Drawing 19 and drawing 20 are the mimetic diagrams for explaining on a substrate two examples of the electron source which carried out array formation of many of a surface conduction form electron emission component.

[0176] First, an insulating substrate with S made [with a substrate] from glass in drawing 19 , the surface conduction form electron emission component with which ES enclosed with a dotted line was prepared on said substrate S, and E1-E10 express the wiring electrode for wiring said surface conduction form electron emission component. On the substrate, along the direction of X, a surface conduction form electron emission component makes a train, and is formed (this is hereafter called an element array). Common wiring of the surface conduction form electron emission component which constitutes each element array is electrically carried out at juxtaposition with the wiring electrode of the both sides which sandwich this (for example, the 1st train is wired with the wiring electrodes E1 and E2 of both sides).

[0177] The electron source of this example can drive each element array independently by impressing proper driver voltage to wiring inter-electrode. Namely, what is necessary is just to impress the suitable electrical potential difference (for example, 0 [V]) which does not exceed an electron emission threshold to the element array which does not emit an electron beam for the suitable electrical potential difference exceeding an electron emission threshold to an element array to make it emit an electron beam again (explanation of still the following describes VE [V] the suitable driver voltage exceeding an electron emission threshold.).

[0178] Next, it is other examples of an electron source which are shown in drawing 20 , and an insulating substrate with S made [with a substrate] from glass, the surface conduction form electron emission component with which ES enclosed with a dotted line was prepared on said substrate S, and E'1 to E'6 express the wiring electrode for carrying out common wiring of said surface conduction form electron emission component. Like the example of said drawing 19 , also in this example, a surface conduction form electron emission component makes a train, and is formed along the direction of X, and common wiring of the surface conduction form electron emission component of each element array is electrically carried out with the wiring electrode at juxtaposition. Furthermore, one wiring electrode is performing near common wiring with which the element array which adjoins in this example adjoins as the wiring electrode E'2 serves as common wiring of one side of the 1st train of an element array, and the 2nd train, for example. The electron source of this example has the advantage that array spacing arranged in the direction of Y can be made small, when the surface conduction form electron emission component and wiring electrode of the same configuration are used as compared with the train of said drawing 19 .

[0179] The electron source of this example can drive each element array independently by impressing proper driver voltage to wiring inter-electrode. Namely, the electron emission element array which carries out electron emission should just impress the electrical potential difference of 0 [V] to the element array to which electron emission of VE [V] is not carried out. For example, the potential of 0 [V] is impressed to each wiring electrode of E'1 to E'3 and the potential of VE [V] is impressed to each wiring electrode of E'4 to E'6 to drive only the 3rd train. consequently -- although the electrical potential difference of VE-0=VE [V] is impressed to the element array of the 3rd train -- other element arrays -- receiving -- 0- 0= 0 [V] -- or VE-VE= -- 0 [V] -- as -- the electrical potential difference of 0 [V] will be impressed -- it divides and comes out. Moreover, what is necessary is to impress the potential of 0 [V] to the wiring electrode E'1, E'2, and E'6, and just to impress the potential of VE [V] to the wiring electrode E'3, E'4, and E'5, in making coincidence drive the 2nd train and the 5th train for example. Thus, it is possible to drive the element array of arbitration alternatively also in this example.

[0180] In addition, in the electron source of above-mentioned drawing 19 and drawing 20 , although the surface conduction form electron emission component was able to be stood in a line in the direction of X in 12 per train from on [of illustration] expedient, an element number may not be restricted to this and may arrange a large number more. Moreover, although the element array of five trains was put in order in the direction of Y, the number of element arrays may not be restricted to this, and may arrange a large number more.

[0181] Next, an example is given and explained about the monotonous mold CRT using the above-mentioned electron source.

[0182] Drawing 21 is drawing to show the panel structure of the monotonous mold CRT equipped with the electron

source of said drawing 17 , the inside VC of drawing is a glass vacuum housing, and FP which is the part shows the face plate by the side of the screen. A transparent electrode made from ITO is formed in the inside of a face plate FP, and the fluorescent substance of red, green, and blue is further distinguished by different color with a mosaic or in the shape of a stripe on this transparent electrode. In order to avoid complication of a drawing, all over drawing, a fluorescent substance is aligned with a transparent electrode and it is shown as a PH. In addition, it is also possible to prepare the black matrix well-known in a field or black stripe of CRT between the fluorescent substances of each color, and to form the well-known metal back layer same on a fluorescent substance. Said transparent electrode is electrically connected the outside of a vacuum housing through Terminal EV so that the acceleration voltage of an electron beam can be impressed.

[0183] Moreover, S is the substrate of the electron source fixed to the base of a vacuum housing VC, and as said drawing 19 explained, array formation of the surface conduction form electron emission component is carried out. In addition, the element array with which 200 per train were wired by juxtaposition in this example is 200 successive-installation eclipse ******. It has connected by turns [the electrode terminals Dp1-Dp200 and Dm1-Dm200, and by turns] which were prepared in the panel side face of both sides, and two wiring electrodes of each element array can impress a drive electrical signal now from the outside of a vacuum housing.

[0184] Moreover, the stripe-like grid electrode GR is formed in the middle of Substrate S and a face plate FP. said element array and the grid electrode GR cross at right angles, and the opening Gh to prepare independently 200 (namely, the direction of Y -- meeting), and make each grid electrode passing an electron beam is formed. Opening Gh may prepare much passage openings in the shape of a mesh depending on the case, although the thing circular one piece at a time is prepared corresponding to each surface conduction form electron emission component. Each grid electrode is electrically connected by the electronic terminals G1-G200 the outside of a vacuum housing. In addition, as long as a grid electrode can modulate the electron beam emitted from the surface conduction form electron emission component, they may be prepared [whose configuration or installation location of the are not] necessarily like drawing 21 a perimeter and near the surface conduction form electron emission component.

[0185] The element array and grid electrode of a surface conduction form electron emission component constitute XY matrix of 200x200 from this display panel. Therefore, by impressing the modulating signal for the image of one line to a grid electrode train at coincidence synchronizing with carrying out the sequential drive (scan) of the one every train of the element arrays, the exposure to the fluorescent substance of each electron beam is controlled, and it displays the image of one line at a time.

[0186] Next drawing 22 is what showed the electrical circuit for driving the display panel of said drawing 21 as a block diagram, and, for SHIRI / Para conversion circuit, and 1003, as for a modulating-signal generating circuit and 1005, the Rhine memory and 1004 are [a decoding circuit for 1000 in drawing 22 to decode the display panel of said drawing 21 , and the composite picture signal which inputs 1001 from the outside, and 1002 / a timing control circuit and 1006] scan signal generating circuits. The electrode terminal of a display panel 1000 is respectively connected with the electrical circuit, and the scan signal generating circuit 1006 and terminals Dm1-Dm200 are connected [the voltage source HV and terminals G1-G200 with which Terminal EV generates the acceleration voltage of 10 [kV]] with the gland for the modulating-signal generating circuit 1004 and terminals Dp1-Dp200.

[0187] Hereafter, the function of each part is explained. First, the decoding circuit 1001 is a circuit for [which is inputted from the outside] decoding composite picture signals, such as an NTSC TV signal, for example, a luminance-signal component and a synchronizing signal component are separated from a composite picture signal, and by making the former into a Data signal, makes the latter a Tsync signal and outputs it to SHIRI / Para conversion circuit 1002 in the timing control circuit 1005. That is, the decoding circuit 1001 arranges the brightness for every color component of RGB according to the color pixel array of a display panel 1000, and carries out a sequential output at SHIRI / Para conversion circuit 1002. Moreover, a Vertical Synchronizing signal and a Horizontal Synchronizing signal are extracted, and it outputs to the timing control circuit 1005. The timing control circuit 1005 generates the various timing control signals for adjusting the timing of each part of operation on the basis of said synchronizing signal Tsync. That is, to SHIRI / Para conversion circuit 1002, Tscan is outputted [Tsp / Tmry] for Tmod to the scan signal generating circuit 1006 to the modulating-signal generating circuit 1004 to the Rhine memory 1003.

[0188] the timing signal Tsp into which the luminance signal Data which inputs SHIRI / Para conversion circuit 1002 from the decoding circuit 1001 is inputted from the timing control circuit 1005 -- being based -- a sequential sampling -- carrying out -- 200 parallel signals I1 - I200 ****** -- it outputs to the Rhine memory 1003. When SHIRI / Para conversion of the data for one line of an image are carried out, the timing control circuit 1005 is written in to the Rhine memory 1003, and outputs the timing control signal Tmry. the Rhine memory 1003 receives Tmry -- I1 - the contents of I200 -- memorizing -- it -- I'1 - although it is referred to as I'200 and outputted to the modulating-signal generating circuit 1004, this is held until the following write-in timing control signal Tmry is inputted into the Rhine memory.

[0189] the timing control signal Tmod which the modulating-signal generating circuit 1004 is a circuit for generating

the modulating signal impressed to the grid electrode of a display panel 1000 based on the brightness data for the image of one line inputted from the Rhine memory 1003, and the timing control circuit 1005 generates -- doubling -- modulating-signal terminal G1 - it is impressed by G200 at coincidence. Although a modulating signal uses the electrical-potential-difference modulation technique which changes the magnitude of an electrical potential difference according to the brightness data of an image, it is also possible to use the pulse width modulation which changes the die length of an electrical-potential-difference pulse according to brightness data.

[0190] Moreover, the scan signal generating circuit 1006 is a circuit for generating the electrical-potential-difference pulse for driving suitably the element array of the surface conduction form electron emission component of a display panel 1000. According to the timing control signal Tscan which the timing control circuit 1005 generates, an internal switching circuit is changed suitably, the suitable driver voltage VE [V] or the grand level (namely, 0 [V]) exceeding the threshold of the surface conduction form electron emission component which the source DV of a constant voltage generates is chosen, and it is impressed by terminals Dp1-Dp200.

[0191] A driving signal is impressed to a display panel 1000 by the above circuit to the timing shown in the timing diagram of drawing 23 . For (a) - in drawing 23 (d), although a part of signal impressed to the terminals Dp1-Dp200 of a display panel from the scan signal generating circuit 1006 is shown, as shown in drawing, the electrical-potential-difference pulse of the amplitude VE [V] is Dp1, Dp2, and Dp3 one by one for every one-line display time of an image. -- It is impressed in order. On the other hand, since terminals Dm1-Dm200 are always connected with the grand level (0 [V]), the sequential drive of the element array is carried out by the above-mentioned electrical-potential-difference pulse from eye the 1st train, and the electron beam is outputted.

[0192] Moreover, the modulating signal for one line of an image is impressed to terminals G1-G200 at coincidence to the timing shown in this drawing (f) by the dotted line from the modulating-signal generating circuit 1004 synchronizing with this. Synchronizing with a scan signal being changed, a modulating signal is also changed one by one, and the image for one screen is displayed. By performing this repeatedly continuously, it is the reason which can display a television animation.

[0193] In the above, although the monotonous mold CRT equipped with the electron source of drawing 19 was explained, the monotonous mold CRT equipped with the electron source of said drawing 20 next is explained using drawing 22 .

[0194] Fundamentally, the monotonous mold CRT of drawing 24 replaces the electron source section of the monotonous mold CRT of said drawing 21 by the type of drawing 20 , and constitutes XY matrix of 200x200 from an electron emission element array and a grid electrode. However, since wiring of the surface conduction form electron emission component of 200 trains is made with 201 wiring electrodes of E1-E201, 201 electrode terminals of Ex1-Ex201 are prepared in the vacuum housing.

[0195] Although the drive circuit which drives this display panel 1008 to drawing 25 is shown, if the scan signal generating circuit 1007 is removed, it is fundamentally [as the circuit of said G4 Fig.] the same. Although the scan signal generating circuit 1007 chooses suitably the suitable driver voltage VE [V] or the grand level (0 [V]) exceeding the electron emission threshold of the surface conduction form electron emission component which the source DV of a constant voltage generates and outputs it to the terminal of a display panel, it shows the timing to the timing diagram of drawing 24 . Although a display panel performs a display action to the timing shown in (a) therefore, a driving signal as shown in (b) - (e) from the scan signal generating circuit 1007 is impressed to electrode terminals Ex1-Ex4. Therefore, an electrical potential difference like (f) - (h) is impressed to a surface conduction form electron emission element array, and a sequential drive is carried out at a time by one train. Synchronizing with this, from the modulating-signal generating circuit 1004, a modulating signal is outputted to timing like (i), and an image is displayed one by one.

[0196] It was that to which the image formation equipment of this example also does so the same effectiveness as an example 2.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing showing the configuration of the fundamental surface conduction mold electron emission component concerning this invention.
[Drawing 2] Drawing for explaining the fundamental manufacture approach of the surface conduction mold electron emission component concerning this invention.
[Drawing 3] Drawing of the measurement evaluation equipment used for the characterization of the surface conduction mold electron emission component concerning this invention.
[Drawing 4] Drawing showing an example of the voltage waveform in the foaming processing concerning this invention.
[Drawing 5] Drawing showing the dependency over the activation time amount of the component current of the surface conduction mold electron emission component concerning this invention, and the emission current.
[Drawing 6] Drawing showing the gestalt change by the activation of the surface conduction mold electron emission component concerning this invention.
[Drawing 7] Drawing showing the emission current of the surface conduction mold electron emission component concerning this invention, a component current, and the example of a type of the relation of a component electrical potential difference.
[Drawing 8] Drawing showing the configuration of the electron source substrate concerning this invention.
[Drawing 9] Drawing showing the basic configuration of the image formation equipment concerning this invention.
[Drawing 10] Drawing showing the fluorescent screen used for the image formation equipment of drawing 10 .
[Drawing 11] Drawing showing the surface conduction mold electron emission component of the example 1 of this invention.
[Drawing 12] Drawing showing the configuration of another mode of the fundamental surface conduction mold electron emission component concerning this invention.
[Drawing 13] Drawing showing a part of configuration of the electron source of the example 2 of this invention.
[Drawing 14] The A-A' sectional view of drawing 13 .
[Drawing 15] The sectional view for explaining the production process of the electron source of the example 2 of this invention.
[Drawing 16] The sectional view for explaining the production process of the electron source of the example 2 of this invention.
[Drawing 17] Drawing for explaining the display of the example 3 of this invention.
[Drawing 18] Drawing showing the configuration of the conventional surface conduction mold electron emission component.
[Drawing 19] The outline block diagram of the electron source substrate of the image formation equipment of the example 4 of this invention.
[Drawing 20] The outline block diagram of the electron source substrate of the image formation equipment of the example 4 of this invention.
[Drawing 21] The panel block diagram in the image formation equipment of the example 4 of this invention.
[Drawing 22] The block diagram for explaining the electrical circuit for driving the image formation equipment of the example 4 of this invention.
[Drawing 23] The timing diagram Fig. for explaining the drive of the image formation equipment of the example 4 of this invention.
[Drawing 24] The panel block diagram in the image formation equipment of the example 4 of this invention.
[Drawing 25] The block diagram for explaining the electrical circuit for driving the image formation equipment of the example 4 of this invention.

[Drawing 26] The timing diagram Fig. for explaining the drive of the image formation equipment of the example 4 of this invention.

[Description of Notations]

1 Substrate
2 Thin Film for Electron Emission Section Formation
3 Electron Emission Section
4 Thin Film Containing Electron Emission Section
5 Six Component electrode
84 74 Electron emission component
82 83 Wiring
85 Connection
91 Rear Plate
92 Housing
93 Transparence Substrate
94 Fluorescent Screen
95 Metal Back
96 Face Plate
98 Envelope
141 Layer Insulation Layer
142 Contact Hole

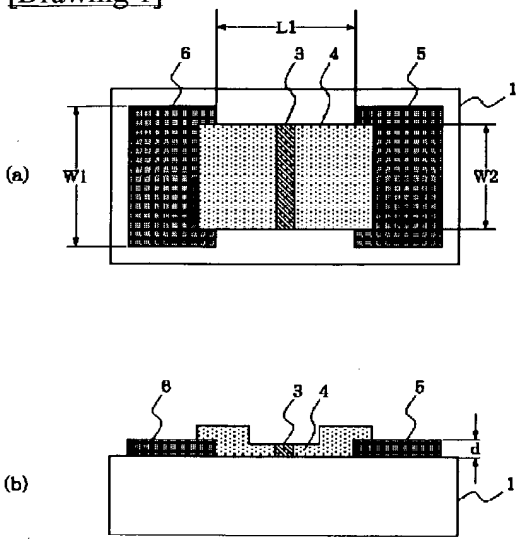
[Translation done.]

* NOTICES *

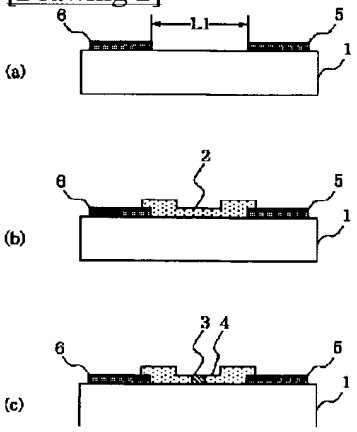
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

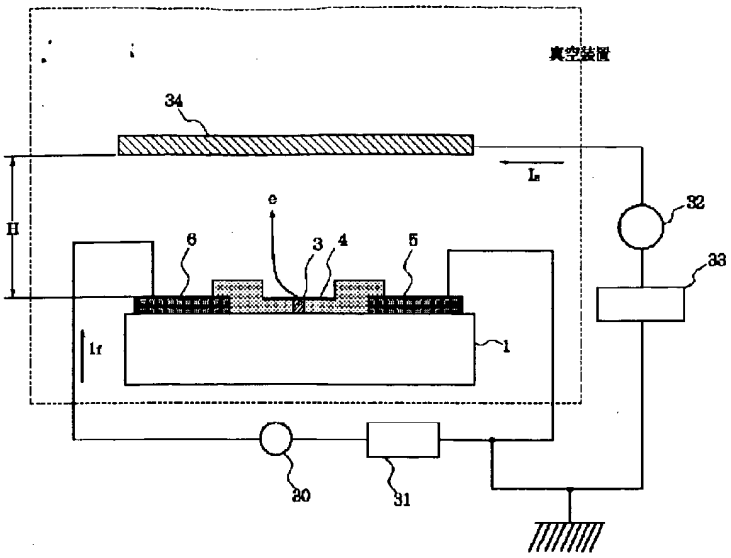
[Drawing 1]



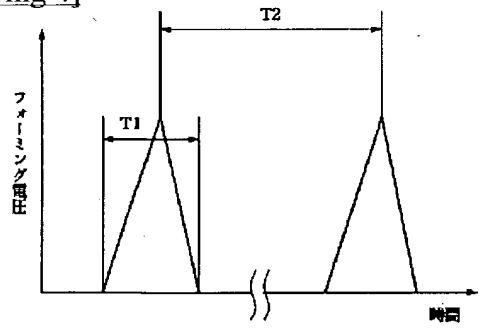
[Drawing 2]



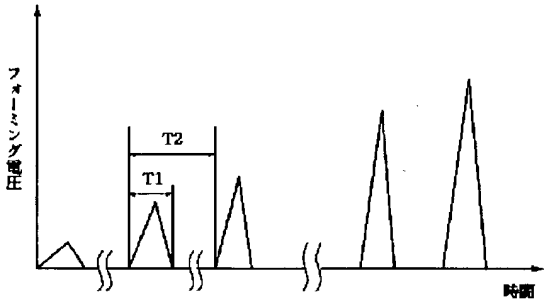
[Drawing 3]



[Drawing 4]

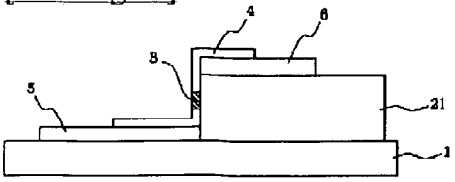


(a)

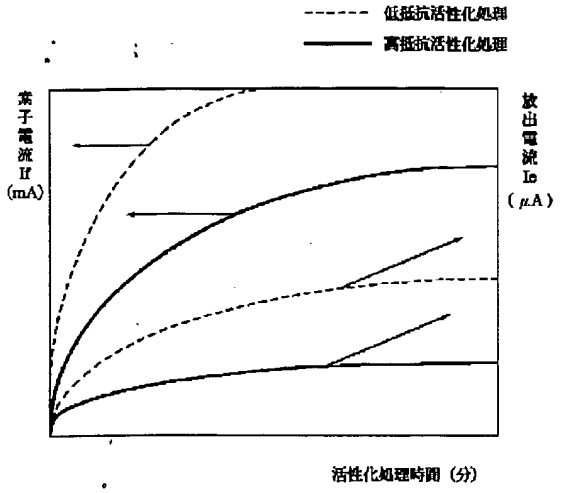


(b)

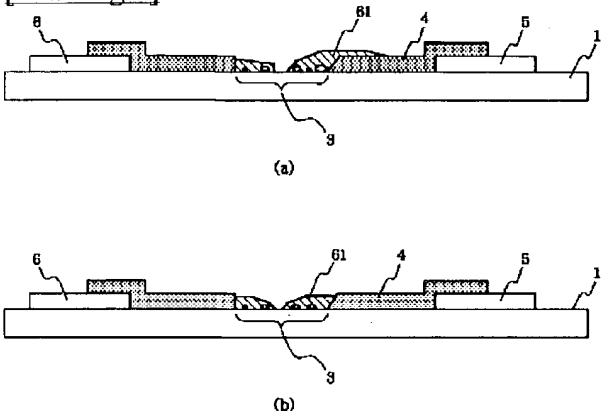
[Drawing 12]



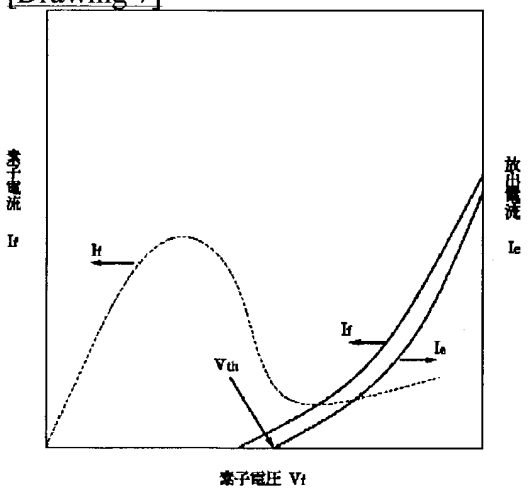
[Drawing 5]



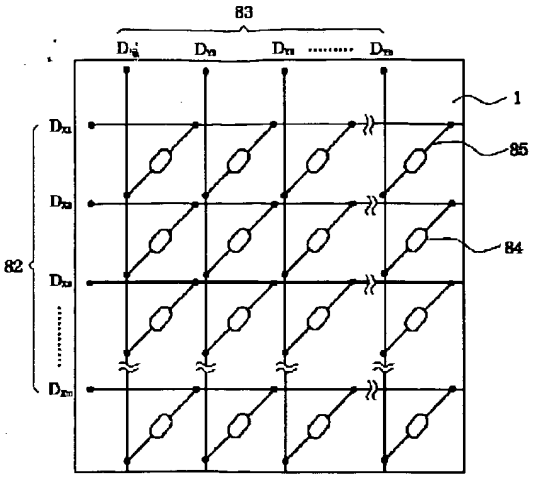
[Drawing 6]



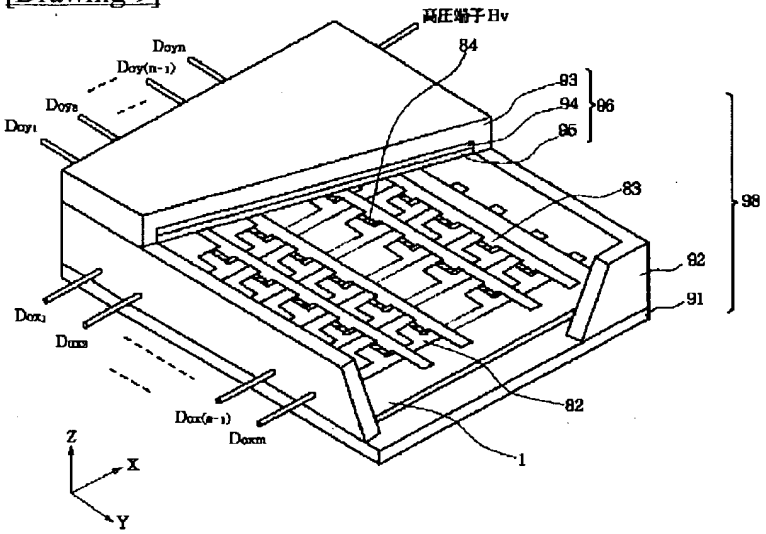
[Drawing 7]



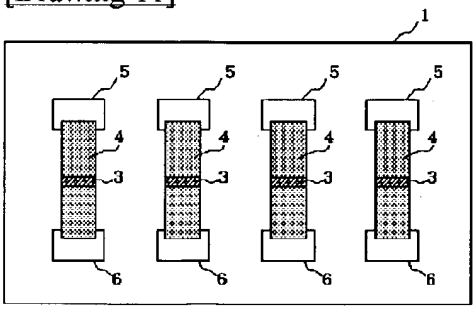
[Drawing 8]



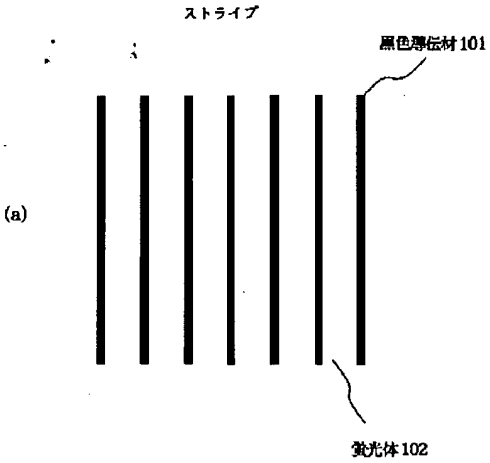
[Drawing 9]

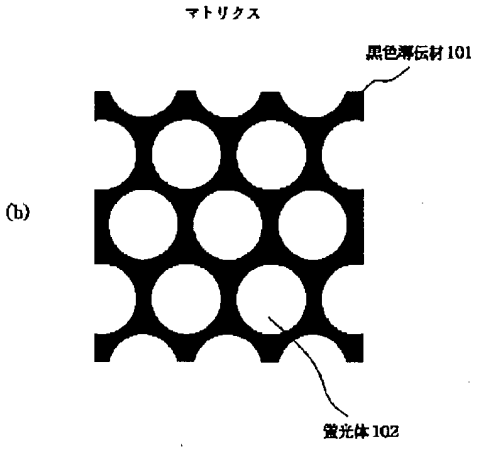


[Drawing 11]

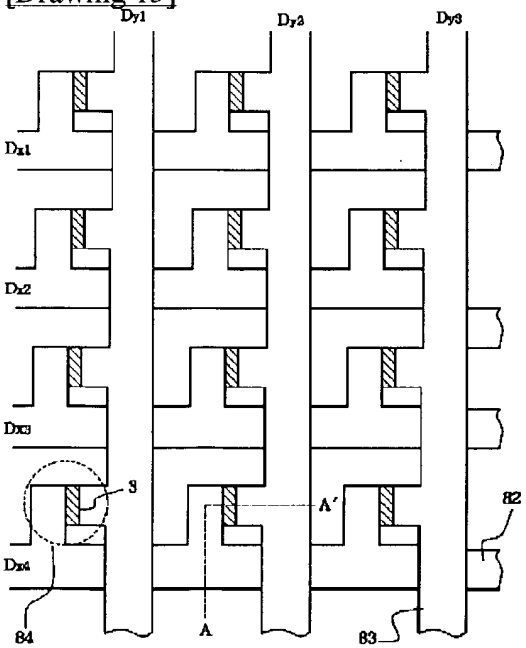


[Drawing 10]

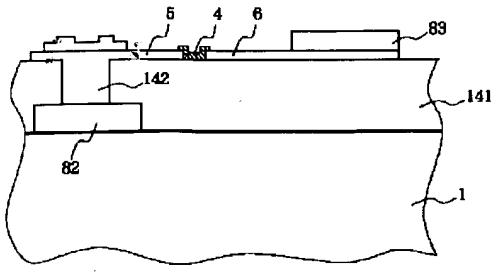




[Drawing 13]

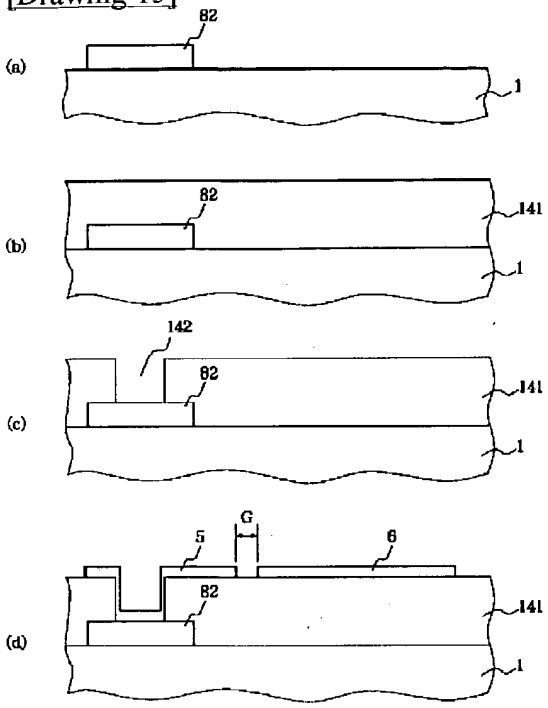


[Drawing 14]

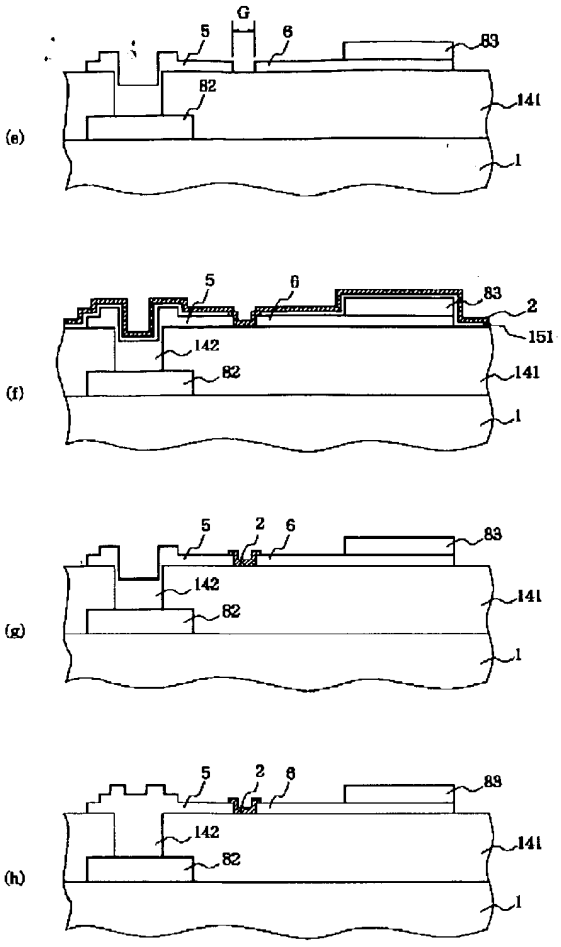


A – A' 断面図

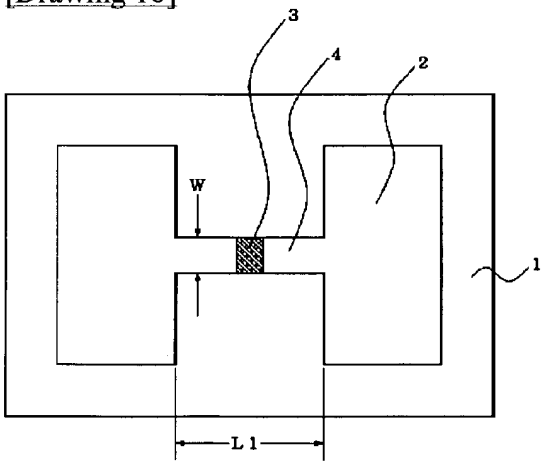
[Drawing 15]



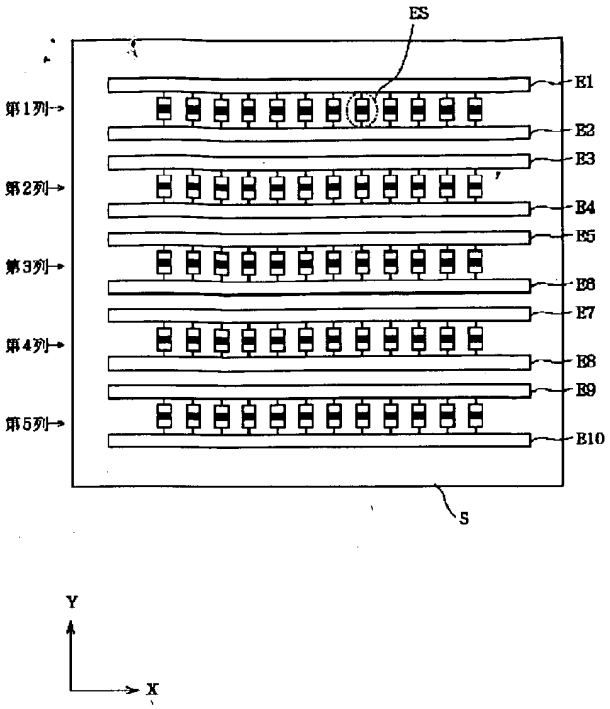
[Drawing 16]



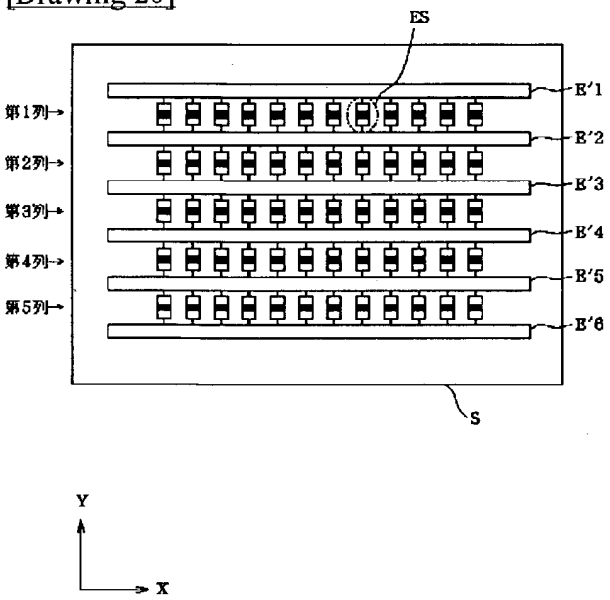
[Drawing 18]



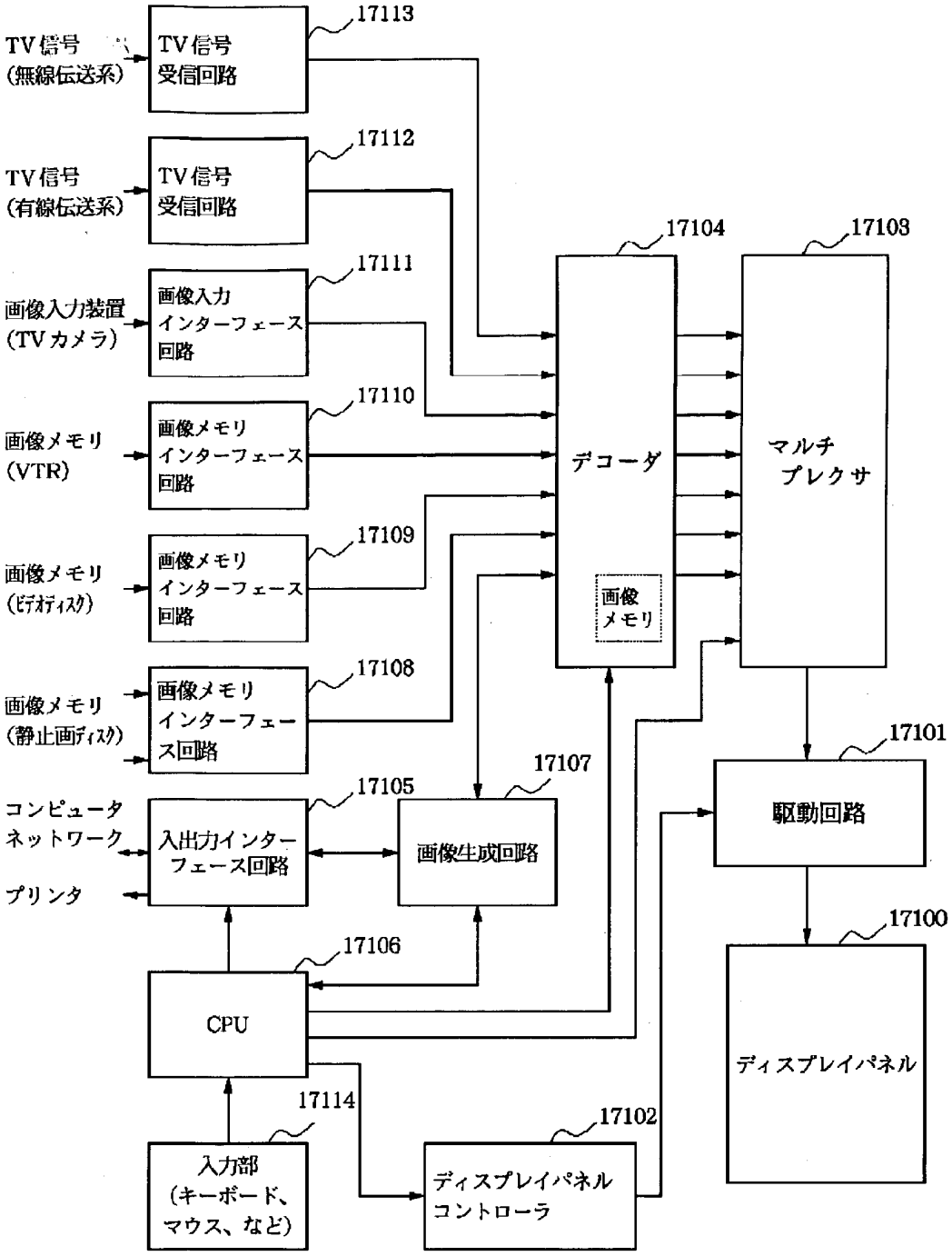
[Drawing 19]



[Drawing 20]



[Drawing 17]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(無線伝送系)
TV信号
受信回路
17113
TV信号
(有線伝送系)
TV信号
受信回路
17112
画像入力装置
(TVカメラ)
画像入力
インターフェース
回路
17111
画像メモリ
(VTR)
画像メモリ
インターフェース
回路
17110
画像メモリ
(ビデオディスク)
画像メモリ
インターフェース
回路
17109
画像メモリ
(静止画ディスク)
画像メモリ
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回路
17108
コンピュータ
ネットワーク
プリンタ
入出力インター
フェース回路
17105
画像生成回路
17107
CPU
17106
入力部
(キーボード、
マウス、など)
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ディスプレイパネル
コントローラ
17102
デコーダ
画像
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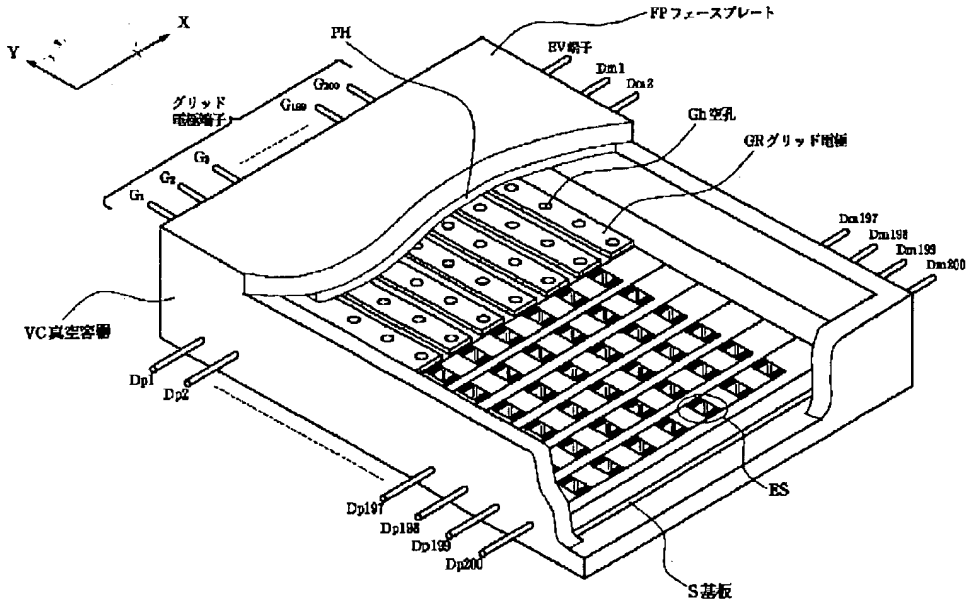
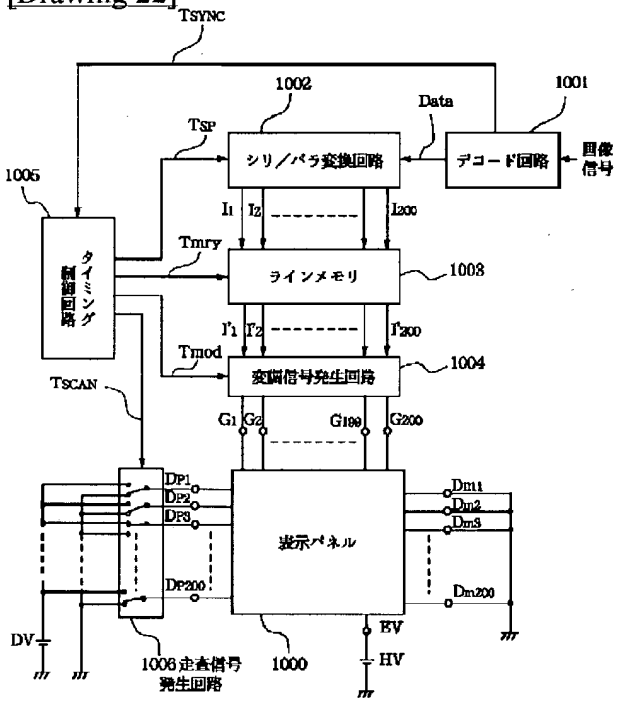
17100

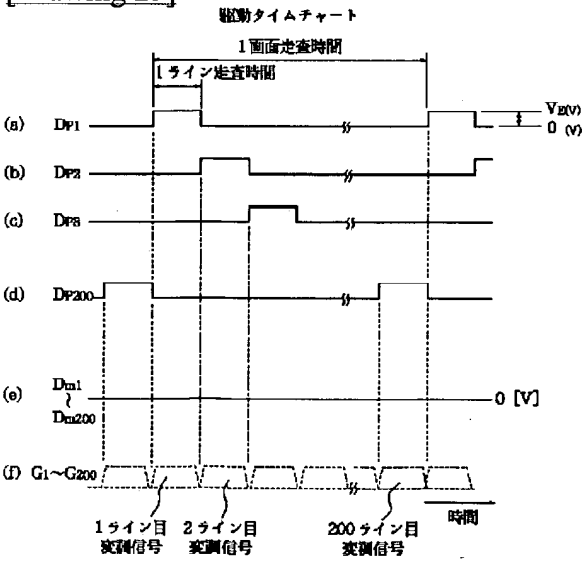
[Drawing 21]



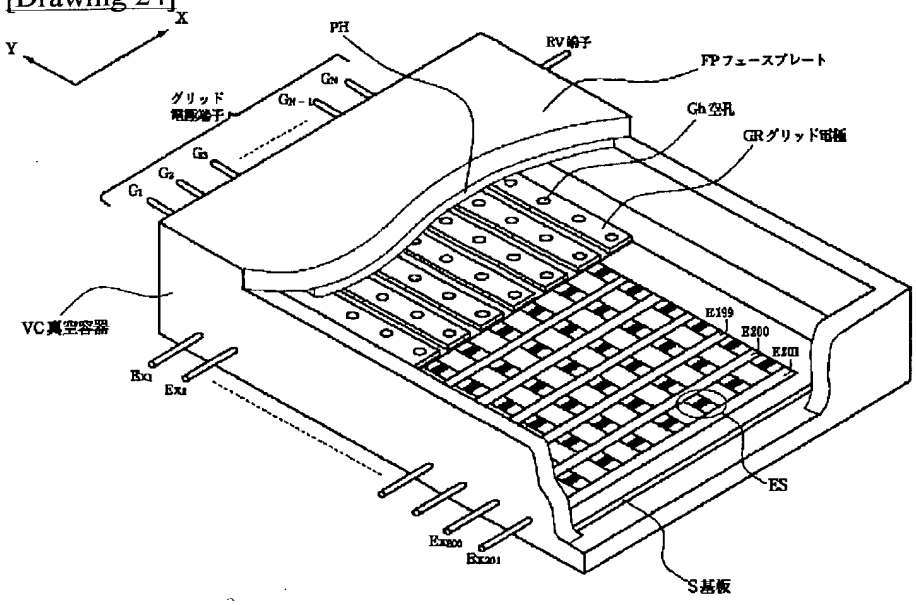
[Drawing 22]



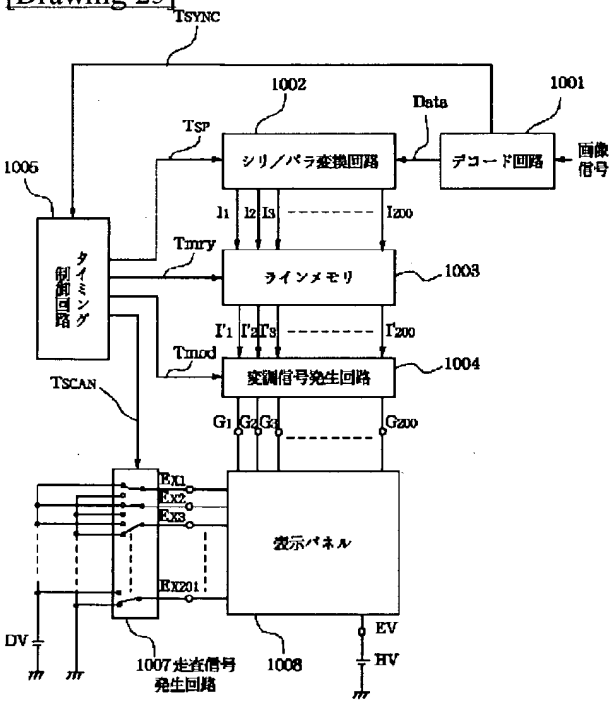
[Drawing 23]



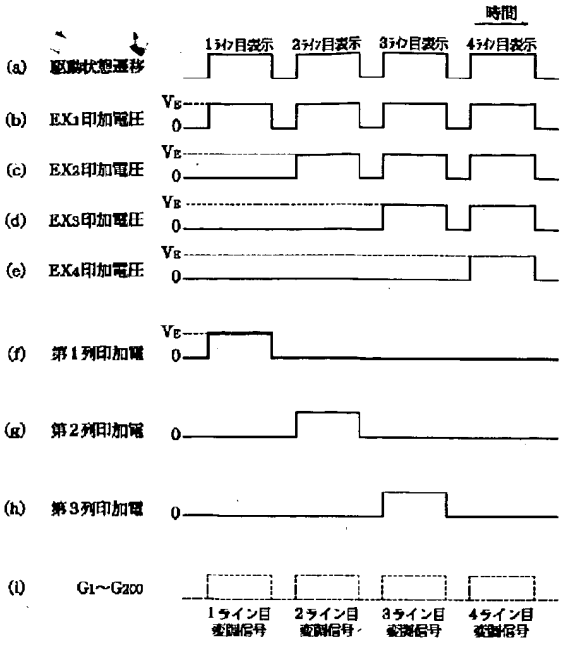
[Drawing 24]



[Drawing 25]



[Drawing 26]



[Translation done.]